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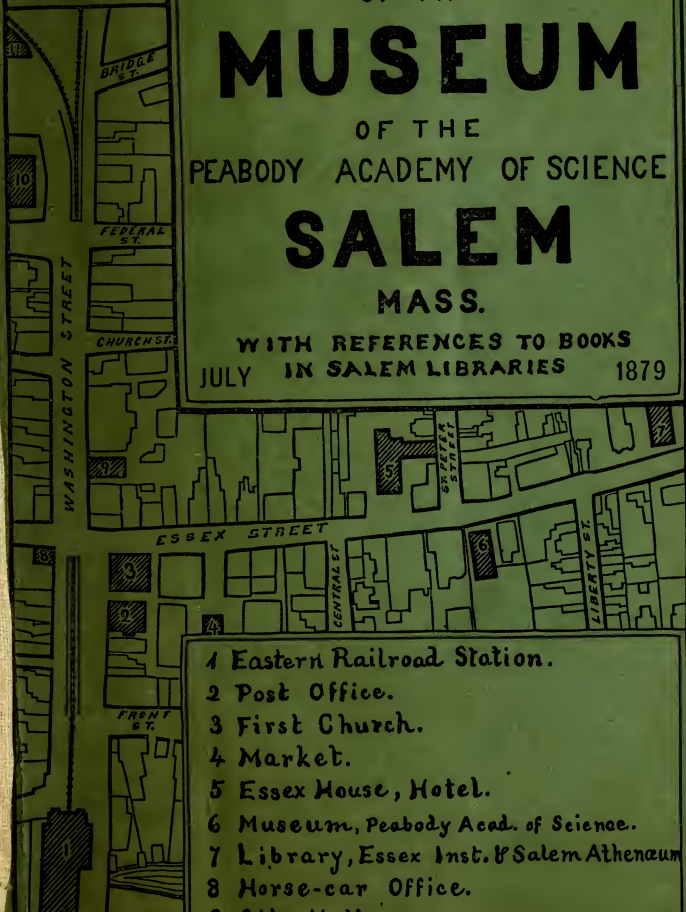
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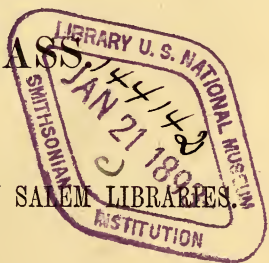
OF THE

MUSEUM

OF THE

PEABODY ACADEMY OF SCIENCE
...

SALEM, MASS.



WITH REFERENCES TO BOOKS IN SALEM LIBRARIES.

PUBLISHED BY

THE PEABODY ACADEMY OF SCIENCE,
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INTRODUCTION.

THE present museum has been formed from two separate collections, one begun in 1799 by the Salem East India Marine Society, the other in 1833 by the Essex County Natural History Society.

The East India Marine Society was composed of masters and supercargoes of vessels who had sailed around the Cape of Good Hope or Cape Horn. Its principal object was to help poor and disabled members, but it also undertook to collect charts and books on navigation and the journals of voyages made by Salem vessels, and to form a museum of curiosities from foreign countries. The first room for the museum was in the brick building on the northeast corner of Essex and Washington streets, the room now occupied by the Salem Observer office. The first specimen mentioned in the records of the society is one of the Chinese figures, for which it was voted in 1801 to have a head carved in wood. In 1804 the society moved into the Salem bank building, where No. 173 Essex street now stands, and the museum occupied the second floor, about 40 by 60 feet, with cases around the walls. The collection consisted of all sorts of objects, without any attempt at scientific arrangement, and it was not till 1820 that it was put in order and a superintendent appointed. In 1821 the first printed catalogue was pub-

lished. In 1825 the East India Marine Hall, the same building now occupied by the museum, was erected. It was owned in shares partly by the society and partly by individual members. The lower floor was let for business offices, and the museum occupied the second floor, 100 by 40 feet. New mahogany cases were built along the western side, while those from the old building were fitted up on the eastern. A long curved table, around which stood green wooden chairs, was used by the members of the society at meetings and suppers, and at winter meetings wood fires were built in two of the four fireplaces. In the centre of the room, surrounded by a low iron railing, stood a group of clay figures of natives of India, and two others sat in chairs at the sides of the stairway. Over the stairs was the Palanquin and above it models of ships. The dried head of a Feejee islander in one of the cases was thought at this time to be hardly a proper object for public exhibition, and a curtain was therefore hung before it, which those who dared could raise. The collection increased rapidly and in 1831 a new catalogue was published. The museum was never open to the public, but visitors were admitted by members or at certain times by the janitor on showing a ticket from a member, and their names were registered in a book kept for the purpose. The museum continued to increase up to 1850, after which from want of interest among the members a superintendent was no longer appointed and it remained without much change till the present arrangement was made in 1867.

The Essex County Natural History Society was organ-

ized in 1833. It had at first a room in the second story of No. 186 Essex street, opposite Central. The collection in the spring of 1834 was hardly large enough to fill a book-case which had been given to the society. In 1835 they moved into the fourth story of the Franklin building, corner of Essex and Newbury streets, but this proving an unsuitable place, moved again in 1837 to the Masonic hall on Washington street, where the Holyoke building, No. 112, now stands. Here the museum occupied a room 15 by 30 feet, adjoining a larger one used for meetings and lectures. The collections could be seen by visitors at the meetings of the society and at the horticultural exhibitions, which were at this time frequent and popular. In 1842 the society moved to the rooms 173 Essex street, formerly occupied by the East India Museum. This building was altered in 1844, when a number of new cases were built and the collection re-arranged. A small room on the lower floor served as a laboratory for zoological and anatomical work, and was occupied much of the time by active members of the society. In 1848 the Natural History Society united with the Essex Historical Society to form the Essex Institute. In 1857 the Institute moved to the newly built Plummer Hall, where the museum was arranged in the lower story in the cases now used for books. About this time several young members of the society went to study zoology at the new museum in Cambridge. They were still often in Salem and with their fellow students did much to improve the collection of the Essex Institute, and in 1864, when several assistants left Cambridge, they came to Salem and were there employed

part of the time at the museum. In consequence of the activity of the society at this time, George Peabody, of London, gave, in 1867, \$140,000.00 for scientific uses in Essex County. The trustees of this fund were incorporated as the Peabody Academy of Science. They bought the building of the East India Marine Society and united its collection with that of the Essex Institute, forming with the additions since made the present museum. Since 1868 the city government has employed a police officer daily at the museum, so that it can be kept always open to the public, and is visited yearly by 30,000 to 40,000 persons.

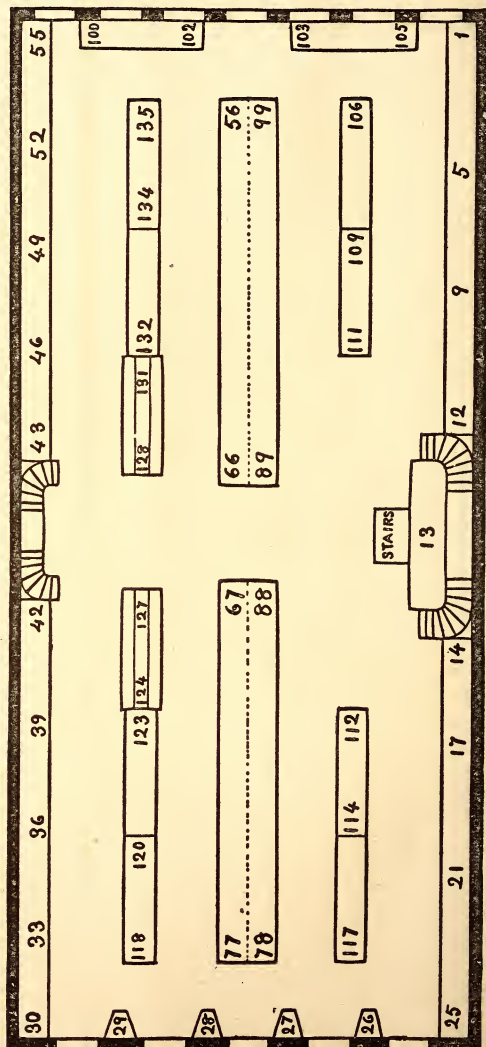
Since the formation of the Essex County Nat. Hist. Society one of the principal objects of the museum has been to collect and exhibit the animals, plants and minerals of Essex County, and it now contains a very complete collection of all classes of Vertebrates, Crustacea, Mollusks and Echinoderms from this neighborhood. The Insects of the county are not separated from the general collection but form a large part of it, and may be recognized by their labels. The collection of Essex County plants is very complete, and arranged so that it can be consulted by any students of botany who wish to use it. The wood and fruit of the trees of the county and some dry Lichens and Fungi are exhibited in the cases with the rest of the county collection in the western gallery.

Besides the local collection the museum contains many valuable things which have been brought from foreign countries chiefly by the ship-masters sailing from Salem. The Ethnological collection consists largely of manufactures from Africa, India, China, and the Pacific islands,

brought together in this way. The latter collection contains a large number of specimens illustrating the habits and manufactures of the Indians and pre-historic races of North America, to which additions are constantly being made. The work now going on in the museum is principally the improvement of the local collection and the arrangement of instructive specimens which will be useful to students.

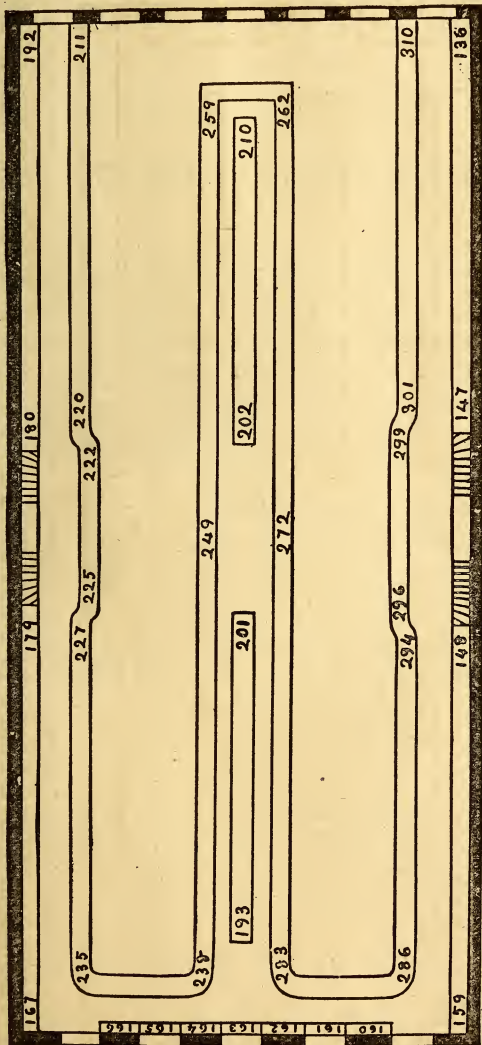
This catalogue has been prepared to show visitors what there is in the museum and where to find what they wish to see. To avoid increasing the size and expense of the book no long descriptions have been given, but there are references to books which can be seen in the museum library or other libraries in Salem, and the officers of the museum will give any assistance they can to visitors in finding what information they want.

PLAN OF MUSEUM.



1 to 27, Ethnology; 28 to 29, Skeletons; 30 to 37, Fishes; 37 to 42, Reptiles; 43 to 55, Fossils; 56 to 66 and 89 to 99, Corals and Sponges; 67 to 77, Birds; 78 to 88, Mammals; 89 to 99, Corals; 100 to 104, Minerals; 106 to 123 and 132 to 135, Shells; 124 to 127, upper part birds nests and eggs, lower part Reptiles; 128 to 141, Fossils; 132 to 135, Shells.

PLAN OF GALLERY.



136 to 150, Weapons; 150 to 159, Boats; 160 to 176, Plants; 176 to 179, Quadrupeds of Essex County; 180 to 192, Birds of Essex County; 193 to 201, Sponges, Polyps, Echinoderms, Worms, Crustacea, Fishes, Reptiles of Essex County; 202 to 210, Echinoderms, Worms, Crustacea and Insects; 211 to 220, Minerals of Essex County; 220 to 227, Nests of Essex County Birds; 227 to 235, Mollusca of Essex County; 235 to 283, Insects; 283 to 286, Spiders; 286 to 310, Shell and stone tools and Pottery,

DIRECTIONS TO VISITORS.

Visitors who wish to look over the whole museum are recommended to see first the Essex County collections in the middle and western galleries; second, the insects and other animals in the middle gallery; third, the general collection of animals on the lower floor; fourth, the ethnological collection on the eastern side beginning with the gallery.

On the door of each case is a card on which are two numbers like these:

The upper is the number of the case, and the lower of the page in the catalogue where the contents of the case are mentioned. References are given

to books which can be found in libraries in Salem in which further information about the objects in the museum is contained.

The books belonging to the museum and the specimens mentioned in the catalogue, which are not in the glass cases, can be seen at the office down stairs.

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ANIMALS OF ESSEX COUNTY.

Middle and western galleries.

Protozoa. Case 193.

Microscopic, one-celled animals. The drawings show Vorticella, Paramecium and Euglena from fresh water ponds. See microscopic specimens.

BOOKS.—Pritchard's Infusoria; Carpenter on the Microscope; Mind in Nature, by H. J. Clark and the microscopical magazines.

Sponges. Case 193.

Animals of irregular shape. When living, currents of water run in the smaller holes and out the larger, carrying the food on which the animal lives. The body is filled with a network of fibres and spicules, which keeps its shape after the sponge is dead and the softer part decayed and washed away, as in the specimens of *Chalina oculata*, the common sponge of Salem harbor. *Spongilla* is a fresh water sponge from ponds and water pipes. See sponges in Case 56 down stairs, also microscopic specimens.

BOOKS.—Guides for Science Teaching, No. 3, by A. Hyatt, published by Boston Soc. of Nat. Hist.; North American Poriferæ, by A. Hyatt, in Memoirs Boston Soc. Nat. Hist.; Life Histories of Animals, by A. S. Packard, jr.

Polyps. Case 194.

Soft cylindrical animals living in water attached by one end or partly buried in mud. The mouth is in the middle of the outer end surrounded by radiating tentacles.

The drawing shows *Metridium marginatum* from living specimens from the Essex bridge, Salem. Specimens of the same species are in the case in alcohol. The larger species are from deep water outside Salem harbor. *Peachia parasitica* lives under large jelly fishes.

BOOKS.—Dana's Corals and Coral Islands; Our Sea Anemones, by A. E. Verrill, American Naturalist, Vol. 2, p. 251; Sea Anemones, Pop. Sci. Monthly, Vol. 7, p. 1; Arachnaetis brachiolata, a floating Actinia, A. Agassiz, Boston Journal of Nat. Hist., Vol. 7, p. 525.

Jelly fishes. Case 194.

Transparent, round or bell-shaped animals floating in the sea. Their eggs become attached and grow up into stationary polyp-like animals, often branched like seaweeds with a polyp at the end of each branch. Some of these branches at length produce polyps, which separate from the stem and become free swimming jelly-fishes. The glass models show the development of *Aurelia*, the common white jelly fish, and the drawing that of *Coryne mirabilis*. Specimens of *Aurelia* are shown in alcohol in this case and there are microscopic preparations of smaller species. The dry specimens are hydroids, the branching stationary young of jelly fishes. There are drawings and microscopic specimens of the fresh water hydra in the library.

The Ctenophoræ are represented by a drawing of *Pleurobrachia* from Agassiz, and shrunken specimens in alcohol.

BOOKS.—A. Agassiz, Acalephs (Jelly fishes) of North America, with pictures of most of the species, in Catalogue of Museum of Comparative Zoology; L. Agassiz, Contributions to the Nat. Hist. of the United States, Vol. 4; Agassiz, Seaside Studies in Nat. Hist.; Sertularian Zoophytes of the Coast of England, T. Hincks, Pop. Science Review, 1878, p. 223.

Echinoderms. Case 195.

Usually five-sided animals all living in the sea. Many of them grow from the egg to two-sided worm-like larvæ and swim for some time at the surface of the water. Around the intestine of this larva grow side by side the lobes of the five or more sided Echinoderm, which afterwards arrange themselves in a radiate form. See drawings and microscopic preparations.

ASTERIDÆ. *Asterias vulgaris* and *Asterias arenicola*, the common star fishes of the shore, where they live on oysters and mussels. *Cribrella sanguinolenta* is purplish red when living. *Ctenodiscus crispatus* and *Hippasteria phrygiana* are deep water species, occasionally dredged or brought up on fish hooks.

OPHIURIDÆ. *Ophiopholis aculeata*, the common long-armed star fish from the roots of sea-weeds. *Amphiura elegans* and *Ophioglypha sarsii*, the latter a deep water species.

ECHINI. The common sea egg; dried specimens in their natural condition and with the spines rubbed off, as they are often found on beaches. Drawing of young. The sand dollar, *Echinarachnius*, is a flattened form less common here.

HOLOTHURIDÆ. *Leptosynapta girardii*, a long species, and *Caudina arenata*, both live in sand, buried except the mouth and arms. *Lophothuria fabricii*, a large red species, is flattened on one side where there are three rows of suckers. The rest of the body is covered with hard scales.

BOOKS.—Natural History of the Star-fish, by A. Agassiz, in Memoirs of Museum of Comp. Zool.; Echinoderms of New England, by A. E. Verrill, in Boston Journal of Nat. Hist., Vol. 10; Verrill, Invertebrata of Vineyard Sound; Agassiz, Seaside Studies in Natural History.

Worms. Case 195.

POLYCHÆTA. *Lepidonotus squamatus* and *Harmothœ imbricata* are short, stout worms with the back covered with scales. They live under stones and sea-weeds on the sea shore. *Nephtys cæca* lives in mud between tides. *Autolytus cornutus* swims in the water when mature. The young live among sea-weeds and hydroids. As they grow larger they divide into two or more worms, some of which swim away and become adult males and females. *Nereis virens* and *Nereis pelagica* live in mud on the sea shore and are the species often dug for bait. They sometimes come out of their holes and swim in the water. *Lumbriconereis fragilis* lives also in mud. The body is round and the appendages short as in the common earth worm. *Rhynchobolus americanus* has a very large proboscis with four hooks on the end, which it thrusts out when dying, as in the specimens. *Cirrhatulus tenuis* has long soft appendages at the sides of each segment. *Clymenella torquata* is one of the commonest sea shore worms. It makes a tube of earth around it. *Cistenides gouldii* makes a strong conical case of sand. *Spirorbis nautiloides* has a white spiral shell attached to sea-weed and often mistaken for snail shells. *Spirorbis lucidus* has a shell with more open spiral.

OLIGOCHÆTA. *Chaetogaster* is a fresh water worm living in great numbers in decaying plants. *Clitellio irrorata* is a blood red species that lives on decaying animals on the sea shore. The common earth worm belongs to this group.

DISCOPHORA. Leeches, flat worms with sucker at each end.

CHÆTOGNATHA. *Sagitta elegans*, a transparent worm with the three pairs of appendages near the head and

fish-like fins at the tail, very plenty in spring in Beverly harbor.

GEPHYREA. *Phascolosoma gouldii*. *Phascolosoma cementarium*.

NEMERTINES. *Nemertes viridis*, common species on sea shore. *Meckelia ingens*, largest species. *Balanoglossus*.

PLANARIÆ. *Leptoplana variabilis*, flat oval worms, living under stones between tides.

NEMATODES. *Ascaris lumbricoides*, pin worm, lives in the intestines of man. *Gordius*, horse-hair worms, in their young state parasitic in insects. *Trichina spiralis*, lives in the flesh of hogs, and when it is eaten matures in the intestines of man and produces another brood, which spreads through his muscles.

CESTOIDS. The pork tape worm, *Tænia solium*, lives in pork as a short worm in the spots called measles. When the pork is eaten it attaches itself to the intestine of man and there grows into a many-jointed worm, the last joints of which mature and drop off with the eggs in them.

BOOKS.—Verrill, Invertebrata of Vineyard Sound, in Report U. S. Commissioner of Fisheries, 1874; Verrill, Parasites of Man and Domestic Animals; Planariæ of our ponds and streams, by E. R. Lankester, in Pop. Sci. Review, Oct., 1867; Alternate generation and embryology of *Antolytus cornutus*, by A. Agassiz, Boston Journ. Nat. Hist., Vol. 7; N. American fresh water leeches, A. E. Verrill, in Am. Jour. of Science, 1872, Vol. 3, p. 126.

Polyzoa. Case 195.

Stationary worm-like animals branching into clusters of various shapes, and the marine species forming shells. In the bottles are shells of several species. See microscopic specimens. The drawings are from fresh water Polyzoa after Hyatt.

BOOKS.—Fresh water Polyzoa, by A. Hyatt in Proc. Essex Institute; Allman, Polyzoa, in Memoirs of Museum Comp. Zoology.

Brachipoda. Case 195.

Terebratulina septentrionalis is dredged in Salem harbor. See Morse, on the early stages of Brachiopods, in Memoirs of Boston Soc. of Nat. Hist. Binney shells of Massachusetts.

Mollusca. Cases 227 to 234.

LAMELLIBRANCHIATA (Bivalves). In case 195 are specimens in alcohol, some with the shell taken off to show better the shape of the animal.

In case 227 to 235 are shells of Essex county species, among which are the ship worm, *Teredo*; the clam, *Mya arenaria*; the razor clam, *Solen*; the hen clam, *Mactra*; the round clam, *Cyprina*; the quahaug, *Venus mercenaria*; the mussels, *Mytilus* and *Modiola*; the scallop, *Pecten*.

GASTEROPODA (Snails). See specimens in alcohol in case 195. In case 233 are the *Chitons*, with shell in eight pieces; the limpets, *Tectura*, with flat shells; *Littorina*, three common species on the shore; *Lunatia heros*, the largest common snail; *Purpura lapillus*, the common white cockle on rocky shores. *Helix* lives on land in damp places; *Lymnea*, fresh water snails; *Physa*, fresh water snails with the shell twisted to the left; *Melampus bidentatus* and *Alexia myosotis* from salt marshes; *Planorbis*, fresh water snails with flat spiral shells; *Limax*, land snails without shells, in alcohol in case 195.

Nudibranchiata, in alcohol, case 195. Marine snails without shells except when young. Drawings of *Eolis* and *Doris*. Model of *Doto coronata*.

CEPHALOPODA (Squids).—Case 195. *Ommastrephes illicebrosa* and *Loligo pealii* from Salem harbor.

BOOKS.—Binney's Gould's Shells of Massachusetts; Verrill, Invertebrata of Vineyard Sound; Terrestrial Air-breathing Mollusks of the United States, by W. G. Binney, Bulletin Mus. Comp. Zoology, Vol. 4, 1878; Fresh-water Mollusks, E. S. Morse, Pop. Sci. Monthly, Vol. 7, p. 563; Natural History of the Oyster, Pop. Sci. Monthly, Vol. 6; The Teredo and its depredations, Pop. Sci. Monthly, Vol. 13. Development of the Pond Snail, by E. R. Lankester, Quarterly Journal of Microscopical Science, 1874.

Tunicata. Case 195.

Drawing of *Cione tenella*, a transparent species growing flat on rocks, *Molgula*, *Cynthia carnea*, *Cynthia echinata*, *Cynthia pyriformis*, large species. *Boltenia*, a large species with long stalk from deep water. *Botryllus gouldii*, a compound animal of five or six individuals arranged in a star-shaped cluster, common on eel grass.

BOOKS.—Binney's Shells of Massachusetts; Ascidiens of the Coast of New England, A. E. Verrill, in Am. Jour. of Science, Vol. 1, 1871; Structure and Affinities of the Sea Squirts (*Tunicata*), by J. C. Galton, Pop. Sci. Review, July, 1868; Verrill, Invertebrata of Vineyard Sound.

Crustacea. Case 196.

DECAPODA. Crabs (*Brachyura*), with the abdomen turned up under the body. The oyster crab (*Pinnotheres*) lives inside the shells of oysters. *Cancer irroratus*, the common shore crab, hatches from the egg like the drawing (Fig. 1), with only the appendages which become mouth parts in the adult. It swims at the surface of the water and grows to the form shown in Fig. 2, with ten legs like the adult. At the next moult it has a more crab-like shape, turns the abdomen under the body, and ceases to swim. *Cancer borealis* is a related species, living in

deeper water. *Hyas coarctata* and *Lithodes arctica* are deep water species sometimes thrown up on the shore. The latter has the hinder pair of legs rudimentary.

Long-tailed Decapods (*Macroura*). Lobster, *Homarus americanus*. Large, dried specimen from Salem. Young of various ages. Half-grown specimens in alcohol just after moulting, with the cast-off skin. The hermit crabs, *Eupagurus bernhardus* and *Eupagurus pubescens* have the abdomen soft and cover it with a snail shell which they carry about with them. Shrimps *Crangon vulgaris*, and other species.

SCHIZOPODA. *Mysis americana*. *Mysis stenolepis*.

CUMACEA. *Diastylis quadrispinosus*.

AMPHIPODA (Sand fleas, etc.). *Caprella*. *Talitrus*, sand flea, lives on sandy beaches above water. *Amphithæ maculata* makes tubes covered with sand under stones and hides in them. *Gammarus ornatus*, the common large amphipod on the sea shore. *Hyperia medusæ* lives on jelly fishes, holding on by its feet.

ISOPODA (Sow bugs, etc.). *Idotea irrorata* and *Idotea phosphorea*, common sea shore species. *Asellus* lives in fresh water ponds. *Porcellio* and *Armadillo* are the sow bugs living on land.

PHYLLOPODA. *Branchipus*. See microscopic specimens.

COPEPODA. Microscopic crustacea very abundant in both salt and fresh water. The drawing shows fresh water *Cyclops*. *Caligus rapax* lives as a parasite on fish. The *Lernæidæ* are free swimming copepods when young. They attach themselves by the head to the animals on which they become parasitic, lose their limbs and grow into simple tubular or sac-shaped bodies.

BARNACLES (*Cirripectida*).—The young barnacles swim in the water first like Fig. 1, later with a bivalve shell like

Fig. 2. They then fasten themselves down by the head and remain fixed.

BOOKS.—Report of U. S. Commissioner of Fisheries, 1874; Crustacea, by S. I. Smith; The Lobster and Lobster Fishery, W. W. Wheildon, Proc. Am. Asso. for Advancement of Science, Vol. 23, 1874; Early Stages of the Lobster, Pop. Sci. Monthly, Vol. 3, 1872, p. 401; Barnacles, by J. S. Kingsley, Am. Naturalist, Vol. 11, p. 102.

Fishes. Cases 197 to 200.

The names used in the following list are those of Goode & Bean's catalogue of the fishes of Massachusetts bay and adjacent waters, lately published in Bulletin of the Essex Institute, Vol. XI. The specimens are in alcohol unless otherwise mentioned.

Lophius piscatorius Monk fish, a stuffed specimen over case 176 in western gallery. *Mola rotunda* Sun fish, a large stuffed specimen marked L over case 192. *Cirrisomus turgidus* Swell fish. *Alutera schoepfi* File-fish, a rare fish in this neighborhood, from near the Lead mills, So. Salem. Stuffed. *Siphonostoma peckianum* Pipe-fish. *Fistularia serrata* Tobacco-pipe fish. *Gasterosteus aculeatus* Stickleback. *Pleuronectes glaber* Christmas fish. *Pseudopleuronectes americanus* Flounder, one dried. *Gadus morrhua* Cod, a dried specimen I over case 184 in western gallery. *Pollachius carbonarius* Pollock, a stuffed specimen H over case 183. *Microgadus tomcodus* Frost fish. *Melanogrammus aeglefinus* Haddock, only a stuffed specimen over case 181. *Phycis tenuis* Hake. *Phycis chuss* Hake. *Onos cimbrius*. *Merlucius bilinearis* Whiting. *Zoarces anguillaris* Wolf fish. *Cryptacanthodes maculatus*, white variety called Ghost fish. *Muraenoides gunnellus* Butter fish, common under stones between tides. *Anarrhicas lupus* Wolf fish. *Cyclopterus lumpus* Lump fish, a stuffed specimen. *Liparis vulgaris*. *Prionotus carolinus* Sea robin. *Cottus* 18

spinosus Sculpin, Grubby. *Cottus grœnlandicus* Sculpin, Grubby. *Hemitripterus americanus* Sea raven, Grubby. *Sebastes marinus* Rose fish. *Tautoga onitis* Tautog, stuffed specimen over case 180. *Tautogolabrus adspersus* Cunner, in Boston and southward, Perch. *Xiphias gladius* Sword fish, stuffed specimen over case 60, middle gallery. *Trichiurus lepturus* Scabbard fish. *Scomber scombrus* Mackerel. *Orcynus thynnus* Horse mackerel, two stuffed specimens over case 179, western gallery. *Carangus hippos*, a stuffed specimen only. *Argyreiosus vomer* Dollar fish. *Seriola zonata* Banded Rudder fish. *Palinurichthys perciformis* Rudder fish. *Poronotus triacanthus*. *Stenotomus argyrops* Scup. *Lepiopomus auritus* Red-tailed Bream. *Eupomotis aureus* "Pumpkin seed," Bream, stuffed specimen. *Enneacanthus obesus* Spotted sun fish, bream. *Centropristis atrarius* Black sea-bass. *Perca fluviatilis* Yellow perch. *Boleichthys fusiformis* Darter. *Roccus lineatus* Striped bass, a stuffed specimen. *Morone americana* White perch, a stuffed specimen. *Pseudopriacanthus altus*, *Ammodytes americanus* Sand eel. *Echeneis naucrateoides* Sucker. *Chirostoma notatum* Silversides. *Scomberesox saurus* Shipjack "Bill fish." *Hydrargyra majalis* Yellow belly, Tom cod, farther south Mummychog. *Fundulus pisculentus* Tom cod, Minnow, Mummychog. *Fundulus multifasciatus*. *Esox reticulatus* Pickerel. *Esox americanus*, *Chauliodus sloanei* a rare fish from a cod's stomach. *Osmerus mordax* Smelt. *Salvelinus fontinalis* Brook trout. *Clupea harengus* Herring. *Alosa sapidissima* Shad. *Pomolobus vernalis* Alewife. *Brevoortia tyrannus* Pogy, Menhaden. *Catostomus teres* Sucker. *Erimyzon sucetta* Chub sucker. *Carassius auratus* Gold fish, naturalized in some ponds around Salem. *Luxilus cornutus*. *Notemigonus chrysoleucus* Shiner. *Semotilus bullaris* Roach, dace. *Rhinichthys atronasmus* Black-nosed dace.

Amiurus catus Horned pout. *Conger vulgaris* Conger eel, larval form from Nahant beach. *Anguilla vulgaris* Eel. *Acipenser oxyrhynchus* Sturgeon, a small specimen in alcohol and larger ones stuffed over case 190, western gallery. *Raia erinacea* Skate, young and egg case, see larger species and skeleton in case 30. *Lamna cornubica* Mackerel shark, stuffed specimens in western gallery A over case 179 and middle gallery Z. *Mustelus canis* Smooth dog-fish. *Squalus acanthias* Dog-fish. *Petromyzon marinus* Lamprey eel.

BOOKS.—Storer, Fishes of Massachusetts. Goode and Bean, List of Fishes of Massachusetts bay and adjacent waters, in Bulletin of the Essex Inst., Vol. 11. Reports of the U. S. Commissioner of Fisheries and various State Commissioners.

Amphibia. Case 201.

These animals lay their eggs usually in water. The young hatch as fish-like tadpoles, without limbs and with gills. As they grow larger the limbs gradually grow and finally they lose their gills and breathe air by lungs. Most species live on land except at the breeding season. The drawing shows the young of the common toad. The collection contains the following species:—

TOADS.—*Bufo americanus*, the toad, eggs and young in several stages. *Scaphiopus solitarius*, a rare toad in this neighborhood.

TREE TOADS, with suckers on the feet for climbing. *Hyla versicolor* and *Hylodes pickeringii*. The latter makes the noise in early spring commonly supposed to come from turtles.

FROGS.—*Rana pipiens*, bull frogs, adults and young in various stages. *Rana palustris*, *fontinalis*, *sylvatica*, *halecina*.

SALAMANDERS with short legs and long tails, some liv-

ing in water, others on land. The red-backed salamander, *Plethodon erythronotus*, is common under stones in woods. *Plethodon glutinosa*, *Amblystoma fasciata*, *A. punctatum* and *Diemictylis miniatus* live in damp places under leaves and stones, *Diemictylis viridescens* usually in water.

BOOKS.—Holbrook's Herpetology of North America. Allen's List of Reptiles and Batrachians near Springfield, Mass.

Reptiles. Case 201.

TURTLES.—*Glyptemys insculpta*, common land turtle and eggs; *Emys meleagris*, a land species found here two or three times, commoner farther west; *Cistudo clausa*, box turtle, a land species; *Nanemys guttata*, the common spotted turtle, lives in water except when it lays its eggs; *Chrysemys picta*, the painted snapping turtle and eggs; *Ozotheca odorata*, a water species with musky smell; *Chelydra serpentina*, mud turtle, largest native species.

SNAKES.—*Crotalus durissus*, rattle snake; *Tropidonotus sirtalis*, striped snake; *Tropidonotus saurita*, ribbon snake; *Nerodia sipedon*, water adder; *Ophibolus eximius*, checkered adder; *Bascanion constrictor*, black snake and eggs; *Chlorosoma vernalis*, green snake; *Storeria DeKayi*, brown snake; *Diadophis punctatus*, ringed snake and eggs.

BOOKS.—Allen, List of Reptiles and Batrachians near Springfield, Mass.; Holbrook's Herpetology of North America; Agassiz, Embryology of Turtles, in Contributions to Nat. Hist. of the U. S.

Birds. Cases 180 to 192.

Beginning at the right. *Turdus migratorius*, robin; *Turdus mustelinus*, wood thrush; *Turdus pallasii*, hermit thrush; *Turdus swainsoni*, olive-backed thrush; *Mimus carolinensis*, cat bird; *Sialia sialis*, blue bird; *Regulus calendula*, ruby-crowned kinglet; *Parus atricapillus*, chick-

adee; *Sitta carolinensis*, white-bellied nuthatch; *Sitta canadensis*, red-bellied nuthatch; *Certhia familiaris*, brown creeper; *Eremophila alpestris*, shore lark; *Anthus ludovicianus*, brown lark; *Mniotilta varia*, black and white creeper; *Parula americana*, blue and yellow warbler; *Helminthophaga ruficapilla*, Nashville warbler; *Helminthophaga peregrina*, Tennessee warbler; *Dendræca æstiva*, yellow warbler; *Dendræca virens*, black-throated green warbler; *Dendræca cærulescens*, black-throated blue warbler; *Dendræca coronata*, yellow rumped warbler; *Dendræca Blackburniæ*, Blackburnian warbler; *Dendræca striata*, black-poll warbler; *Dendræca castanea*, bay-breasted warbler; *Dendræca pennsylvanica*, chestnut-sided warbler; *Dendræca maculosa*, black and yellow warbler; *Dendræca discolor*, prairie warbler; *Dendræca palmarum*, yellow-poll warbler; *Dendræca pinus*, pine warbler; *Sciurus auricapillus*, golden-crowned wagtail; *Sciurus noveboracensis*, water thrush; *Oporornis agilis*, Connecticut warbler; *Geothlypis trichas*, Maryland yellow-throat; *Myiodioctes pusillus*, green black-capped warbler; *Myiodioctes canadensis*, Canadian warbler; *Setophaga ruticilla*, redstart; *Pyrranga rubra*, scarlet tanager; *Pyrranga æstiva*, summer redbird; *Hirundo horreorum*, barn swallow; *Tachycineta bicolor*, white-bellied swallow; *Petrochelidon lunifrons*, cliff swallow; *Cotyle riparia*, bank swallow; *Ampelis cedrorum*, cedar bird; *Vireo olivaceus*, red-eyed vireo; *Vireo flavifrons*, yellow-throated vireo; *Vireo solitarius*, solitary vireo; *Vireo noveboracensis*, white-eyed vireo; *Collurio borealis*, butcher bird; *Pinicola enucleator*, pine grosbeak; *Carpodacus purpureus*, purple finch; *Loxia leucoptera*, white-winged crossbill; *Loxia curvirostra*, common crossbill; *Ægiothus linaria*, red-poll linnet; *Chrysomitris pinus*, pine finch; *Chrysomitris tristis*, yellow bird, goldfinch; *Plectrophanes nivalis*, snow bunting; *Plectrophanes lap-*

ponicus, Lapland longspur; *Passerculus savanna*, Savanna sparrow; *Pœcetes gramineus*, grass finch; *Melospiza melodia*, song sparrow; *Junco hyemalis*, snow bird; *Spizella monticola*, tree sparrow; *Spizella socialis*, chipping sparrow; *Spizella pusilla*, field sparrow; *Zonotrichia albicollis*, white-throated sparrow; *Passerella iliaca*, fox-colored sparrow; *Goniaphea ludoviciana*, rose-breasted grosbeak; *Cyanospiza cyanea*, indigo bird; *Pipilo erythrophthalmus*, towhee bunting; *Dolichonyx oryzivorus*, bobolink; *Molothrus pecoris*, cow bird; *Agelæus phœniceus*, red-winged blackbird; *Sturnella magna*, meadow lark; *Icterus baltimore*, Baltimore oriole; *Scolecophagus ferrugineus*, rusty grackle; *Quiscalus purpureus*, crow blackbird; *Corvus americanus*, crow; *Cyanurus cristatus*, blue jay; *Tyrannus carolinensis*, kingbird; *Myiarchus crinitus*, great-crested flycatcher; *Sayornis fuscus*, pewee; *Contopus borealis*, olive-sided pewee; *Contopus virens*, wood pewee; *Empidonax minimus*, least pewee; *Antrostomus vociferus*, whip-poor-will; *Chordiles virginianus*, night hawk; *Chætura pelasgia*, chimney swift; *Trochilus colubris*, humming bird; *Ceryle alcyon*, kingfisher; *Coccygus erythrophthalmus*, black-billed cuckoo; *Coccygus americanus*, yellow-billed cuckoo; *Picus villosus*, hairy woodpecker; *Picus pubescens*, downy woodpecker; *Picoides arcticus*, black-backed woodpecker; *Sphyrapicus varius*, yellow-bellied woodpecker; *Melanerpes erythrocephalus*, red-headed woodpecker; *Colaptes auratus*, golden-winged woodpecker; *Bubo virginianus*, great horned owl; *Scops asio*, screech owl; *Otus vulgaris*, long-eared owl; *Brachyotus palustris*, short-eared owl; *Syrnium cinereum*, great gray owl; *Syrnium nebulosum*, barred owl; *Nyctea scandiaca*, snowy owl; *Nyctale acadica*, Acadian owl; *Circus hudsonius*, marsh hawk; *Accipiter fuscus*, sharp-shinned hawk; *Accipiter cooperi*, Cooper's hawk; *Astur atricapillus*, goshawk; *Falco gyrfalco*, gyrfalcon;

Falco columbarius, pigeon hawk; *Falco sparverius*, sparrow hawk; *Buteo borealis*, red-tailed buzzard; *Buteo lineatus*, red-shouldered buzzard; *Buteo swainsoni*, Swainson's buzzard; *Buteo pennsylvanicus*, broad-winged buzzard; *Archibuteo lagopus*, rough-legged buzzard; *Pandion haliaëtus*, fish hawk; *Aquila chrysaëtus*, golden eagle; *Haliaëtus leucocephalus*, bald eagle; *Ectopistes migratorius*, wild pigeon; *Zenaidura carolinensis*, Carolina pigeon; *Lagopus albus*, ptarmigan; *Bonasa umbellus*, ruffed grouse; *Ortyx virginianus*, quail; *Squatarola helvetica*, black-bellied plover; *Charadrius virginicus*, golden plover; *Aegialites semipalmata*, ring neck, plover; *Streptopelia interpres*, turnstone; *Lobipes hyperboreus*, northern phalarope; *Philahela minor*, woodcock; *Gallinago wilsoni*, Wilson's snipe; *Macrorhamphus griseus*, red-breasted snipe; *Ereuntes pusillus*, semipalmated sandpiper; *Tringa maculata*, sandpiper; *Tringa maritima*, purple sandpiper; *Tringa wilsoni*, least sandpiper; *Tringa bonapartei*, white-rumped sandpiper; *Tringa canutus*, red-breasted sandpiper; *Calidris arenaria*, sanderling; *Limosa fedoa*, great marbled godwit; *Limosa hudsonica*, Hudsonian godwit; *Totanus semipalmatus*, willet; *Totanus melanoleucus*, greater yellow legs; *Totanus flavipes*, lesser yellow legs; *Totanus solitarius*, solitary sandpiper; *Tringoides macularius*, spotted sandpiper; *Actitis bartramius*, upland plover; *Tryngites rufescens*, buff-breasted sandpiper; *Numenius longirostris*, long-billed curlew, *Numenius borealis*, Esquimaux curlew; *Ardea herodias*, great blue heron; *Ardea egretta*, white heron; *Ardea virescens*, green heron; *Nyctiardea grisea*, night heron; *Botaurus minor*, bittern; *Rallus virginianus*, Virginia rail; *Porzana carolina*, Carolina rail; *Gallinula galeata*, Florida gallinule; *Fulica americanus*, coot; *Branta canadensis*, Canada goose; *Anas boschas*, mallard; *Anas obscura*, black duck; *Dafila acuta*, pin-tail duck; *Chaule-*

lasmus streperus, gray duck; *Mareca americana*, widgeon; *Querquedula carolinensis*, green-winged teal; *Querquedula discors*, blue-winged teal; *Spatula clypeata*, shoveller; *Aix sponsa*, summer duck; *Fuligula marila*, blackhead; *Bucephala clangula*, golden-eyed duck, whistler; *Bucephala albeola*, butter ball; *Harelda glacialis*, long-tailed duck; *Somateria spectabilis*, king eider; *Ædemia americana*, scoter; *Ædemia fusca*, velvet scoter; *Ædemia perspicillata*, surf duck; *Erismatura rubida*, ruddy duck; *Mergus serrator*, red-breasted merganser; *Mergus americanus*, shell-drake; *Mergus cucullatus*, hooded merganser; *Sula bassana*, gannet; *Graculus carbo*, cormorant; *Larus marinus*, black-backed gull; *Larus argentatus*, herring gull; *Larus tridactylus*, kittiwake gull; *Larus atricilla*, laughing gull; *Larus philadelphia*, Bonaparte's gull; *Sterna hirundo*, common tern; *Sterna macroura*, Arctic tern; *Oceanites oceanica*, Wilson's petrel; *Puffinus major*, great shearwater; *Colymbus torquatus*, loon; *Colymbus septentrionalis*, red-throated diver; *Podiceps cornutus*, horned grebe; *Podiceps holbolli*, red-necked grebe; *Podylymbus podiceps*, pied-billed grebe; *Mergulus alle*, sea dove; *Uria grylle*, black guillemot; *Lomvia arra*, thick-billed guillemot.

The nests and eggs of Birds of Essex County are in cases 220 to 227 on the gallery railing.

BOOKS. Catalogue of the Birds of Essex County by F. W. Putnam. Proc. Essex Inst., Vol. I, p. 201. A list of the Birds of Massachusetts, with Annotations by J. A. Allen, Bull. Essex Inst., Vol. X. Coues' Key to North American Birds. Samuel's Birds of New England. Audubon's Birds of America.

Mammals (quadrupeds). Cases 177, 8, 9.

Lynx rufus, wild cat, from Lynnfield and Danvers; *Procyon lotor*, racoon, Ipswich; *Putorius ermineus*, weasel, brown summer, white winter, fur; *Mephitis*, skunk; *Fiber*

zibethicus, muskrat; *Arctomys monax*, woodchuck; *Sciurus carolinensis*, gray squirrel; *Sciurus hudsonicus*, red squirrel; *Pteromys volucella*, flying squirrel; *Tamias striatus*, striped squirrel; *Hesperomys leucopus* and nest; *Arvicola riparia*, field mouse; *Mus rattus*, the black rat, now rare; *Mus decumanus*, common rat; *Mus musculus*, mouse; *Condylura cristata*, star-nosed mole; *Condylura longicaudata*, mole; *Phoca vitulina*, common seal; *Lasiurus noveboracensis*, brown bat; *Phocæna americana*, puffing pig, skeleton; *Delphinus erebennus*, porpoise, skull; case 80 *Globiocephalus*, black fish, skeleton, hanging over case 118.

BOOKS. Mammalia of Massachusetts by J. A. Allen, Bulletin Mus. Comp. Zool., No. 8. Former range of New England Mammals, by J. A. Allen, in Amer. Naturalist, Vol. 10. The Moose in New England, by J. A. Allen, Amer. Naturalist, Vol. 4. The Amer. Chipmunk, C. C. Abbott, Pop. Sci. Monthly, Vol. 7. Description of the whale that came ashore in Boston harbor, Nov. 25, 1871, T. Dwight, Jr., Proc. Boston Soc. Nat. Hist., Vol. 15.

MINERALS.

Cases 211 to 217 in the western gallery contain minerals of Essex County.

Cases 100 to 105 on the floor at the northern end contain the rest of the minerals on exhibition.

PLANTS.

WOODS OF ESSEX COUNTY. In cases 167 to 175 is a collection of the wood and dry fruit of about 160 species of native and extensively introduced trees and shrubs,

illustrated by the plates from Emerson's *Trees and Shrubs of Massachusetts* and some other works.

See also Michaux's *Forest Trees of America*, and Robinson's list of *Trees and Shrubs of Essex County*, with notes in *Bulletin Essex Institute*, Vol. 11.

POISONOUS PLANTS. In case 170 are the native plants which are poisonous to handle or to eat.

CRYPTOGAMS. In cases 160 and 161 are large dried specimens of fungi, lichens, fern stems, etc.

ENDOGENS. In case 166 and over it are the fruits of palms, rice, endogenous wood, etc.

CONIFERS. In case 162 are the wood and cones of the great *Sequoia* of California, cones of the stone pine, larches, spruces, etc.

EXOGENS. In case 164 are the fruits of leguminous plants, olive wood, elm, oak, and ebony, sandal-wood, etc.

ECONOMIC PLANTS. In cases 163 and 165 are the useful products of plants, coffee, cocoa, grains, jute, cotton, gums, etc. This part of the collection has been recently commenced and will be increased.

Besides the above specimens exhibited in glass cases, the museum contains the following which can be seen by applying at the office on the lower floor.

Plants of Essex County.

ALGÆ. Living specimens of fresh water species in the aquaria and 200 species of dried marine algæ.

For descriptions of North American species see Harvey's "*Nereis*," in *Smithsonian contributions* 1858. Farlow's list of marine algæ of the United States, in *Proc. Am. Acad.* Vol. 10. For descriptions of British species, Johnson's "*Nature printed British Sea-weeds*," Harvey's "*History of British Sea-weeds*."

FUNGI. The only specimens are the large, hard species in the southern gallery, case 160 and 161, and some microscopic specimens. The list in the Amherst catalogue by Chas. C. Frost will give some idea of what may be found in this neighborhood.

LICHENS. There are several large species in case 160 and about 100 species temporarily arranged in the library. See Tuckerman's synopsis of the lichens of New England.

CHARACEÆ. About eight species dried, and sometimes living specimens in aquaria.

Descriptions of North American species in the monograph, by B. D. Halstead, in *Proc. Boston Soc. Nat. Hist.*, Vol. 20. Dr. Allen's *Am. char.* with plates, now being published.

MUSCINEÆ. Twenty species of Hepaticæ and 106 species of mosses arranged by Sullivant's classification in Gray's Manual.

VASCULAR CRYPTOGRAMS. Ferns, thirty-three species, and varieties arranged by Gray's Manual.

Also all the species known in the county of *Lycopodium*, *Selaginella*, *Isoetes*, *Ophioglossum*, *Botrychium*, *Equisetum*.

See *Ferns of Essex Co.* by John Robinson, in *Proc. Essex Inst.*, Vols. 8 and 9. *Eaton's Ferns of N. A.*, etc. For structure and reproduction of Cryptogams, see *Sachs' Text Book of Botany*, *Thome's Structural Botany*. For figures of *Botrychium* see *Eaton's Ferns of N. A.* For plates of *Lycopodium* and *Equisetum* see *Hooker's*, "*British Ferns*;" and *Johnson and Sowerby's*, "*British Ferns*."

PHANEROGAMIA. Pressed specimens of about 1100 species arranged by Gray's Manual.

General Collection of Plants.

CRYPTOGAMIA. Besides the large specimens illustrating the principal orders in cases 160 and 161 in the southern gallery, the museum contains the following:—

ALGÆ. Two hundred species, North American and foreign.

FUNGI. One hundred North American species collected by Halstead, deposited by John Robinson.

See Cooke's, "Hand Book of British Fungi," and "Microscopic Fungi."

LICHENS. Fifty species New England lichens, collected by Halstead, deposited by John Robinson; 200 species British lichens, Dixon collection.

For North American species see the works of Prof. Tuckerman.

For foreign species see Fries, "European Lichens;" Bowen and Crombie, "British Lichens."

CHARACEÆ. Ten species.

See Johnson and Sowerby, "British Ferns."

HEPATICÆ. One hundred and fifty North American hepaticæ, by Austin, deposited by John Robinson, and forty species British hepaticæ, Dixon collection.

For American species see Sullivant's "Mosses and Hepaticæ," and Austin's papers in "Torrey Bulletin." For British species see Cooke's, "British Hepaticæ."

MUSCI. Eighty species North American mosses, deposited by John Robinson; 300 species British mosses.

See Sullivant's "Mosses and Hepaticæ." For British species, Berkeley's, "Hand Book of British Mosses."

FERNS. One hundred and fifty species and varieties N. A. ferns, deposited by John Robinson, arranged by Davenport's list, 1879, Mass. Hort. Soc.

See also Eaton's ferns of N. A.; See also for plates, Hooker's "Species Filicúm," Exotic Ferns," etc. Smith's "Historia Filicum."

850 species ferns from all countries, classified by Hooker's Synopsis Filicum.

EQUISETACEÆ. Twenty specimens of Equisetum.

See Gray's Manual, and Hooker's and Johnson and Sowerby's British Ferns.

OPHOGLOSSACEÆ. Fifteen species *Ophoglossum* and *Botrychium*, deposited by John Robinson, classification of Milde's Monograph.

See for N. A. species Eaton's Ferns of N. A., Davenport's, *Botrychium simplex*, and Veneration of the *Botrychia* in Torrey Bulletin, Vol. 6.

RHIZOCARPEÆ. Ten species of *Marsilea*, *Azolla*, *Salvinia*, etc.

See Gray's Manual and British botanies for descriptions, and Sachs' for structure.

LYCOPODIACEÆ. Twenty species North American *Lycopodium*, *Selaginella*, and *Isoetes*, deposited by John Robinson; 100 species *Lycopodium* and *Selaginella* of all countries.

See Gray's Manual for North American species in part. For foreign species, Spring's Monograph, *Lycopodiaceæ*; also a few plates in Hooker's works.

PHANEROGAMIA. About 2000 species North American plants classified by Gray's Manual and Chapman's Southern Flora. Of the above, 500 are *Cyperaceæ* and *Gramineæ*, including northern species collected by Oakes, Pringle, and Macoun, southern by Curtis, and western by Clinton and Hall. There are also included 500 southwestern plants (Phippen collection).

GENERAL COLLECTION OF ANIMALS.

Protozoa. Case 56.

MICROSCOPIC ANIMALS. See drawings in case 193 and microscopic specimens. In case 56 with the sponges are models of microscopic shells of foraminifera from chalk.

BOOKS.—Pritchard's Infusoria, Depths of the Sea, by Wyville Thompson, Monthly Microscopical Journal, Quarterly Micro-

scopical Journal. Bastian's origin of lowest Organisms and Beginnings of Life. Carpenter on the Microscope. Clarke's Mind in Nature. Notices of Protozoa by Prof. Leidy, in Proceedings Philadelphia Acad. Nat. Sci., "Water turned to Blood," by red infusoria, in Pop. Sci. Monthly, Vol. 4, p. 202.

Sponges. Cases 56 and 57.

Pictures, 1, of young sponge; 2, section of sponge. While the sponge is living, water runs in the small holes and out the large ones, passing through the chambers B, where the food is taken up and digested. The sponge is filled with a framework of fibres and spicules which holds its shape after the softer parts have decayed and been washed away, as in most of the specimens.

Spongia cerebriformis, from Florida, used for washing.

Hircinia campana, *Tubaplicifera*, and *Verongia fistularia*, tubular and irregular species from Florida, have the fibres stiff and brittle.

Euplectella speciosa, case 57, has a framework of white spicules like glass crossing each other regularly like the threads of lace.

Spongilla grows in fresh water in irregular lumps, and has a framework made up of short spicules that drop apart when the sponge decays. Specimens from fresh water ponds and from aqueduct pipes.

In case 56 and on top of the middle gallery cases are large cup-shaped sponges with close, hard fibres like wood.

BOOKS.—Hyatt, North American Porifera, in Memoirs Boston Soc. of Nat. Hist., 1875 and 1877. Guides to science teaching No. 3, published by Boston Soc. of Nat. Hist. The glass sponges by Rev. Samuel Lockwood, in Pop. Sci. Monthly, Vol. 3, p. 529. The common fresh water sponge, *Spongilla*, by Prof. W. C. Williamson, in Pop. Sci. Review, Jan., 1868

Polyps, Corals. Cases 58 to 66 and 89 to 98.

Corals are the skeletons of Polyps. In most of the specimens the soft part has decayed and been removed. The white, stony corals are from Actinoid polyps, round animals with six or several times six tentacles, and as many radiating chambers round the mouth. The coral grows under and around the polyps and between the radiating chambers, leaving, when the animal decays, a stone with holes divided nearly to the centre by radiating plates. See *Astraea*, case 94.

The colored, fan-shaped, and branching corals are from Alcyonoid polyps, with eight arms. See glass model in case 60. These corals consist of a horny core, formed by the bases of the polyps and covered by a softer bright-colored crust, beyond which the polyps stretch when expanded.

ACTINOID CORALS. Beginning at case 97. *Fungia*, round corals, each from one polyp.

Astraea, case 94, consists of colonies of smaller polyps. In the brain coral from Bermuda, in same case, the animals are of irregular shape, folded around each other like the ridges of a brain.

Madrepora has very small animals arranged in cylindrical clusters like branches of trees.

ALCYONOID CORALS. Cases 58, 59, 60, 61.

Pennatula and *Renilla* form small fleshy clusters of regular shape; specimens in alcohol, case 57. The glass model in case 60 shows the red coral used in jewelry, with the polyps expanded, natural size, and enlarged.

On the lower shelf, in case 59, are *Pimnoa* and *Pterogorgia* from Georges Bank, brought up on fish hooks. The former shows the polyps dried in natural shape. Another specimen has the polyps partly rubbed off,

showing the black core. The other fan-shaped corals belong to this group, also the organ pipe coral, case 61.

Millepora alcicornis, case 61, is the coral of a hydroid polyp.

Jelly Fishes. Case 57. See page 12 for native species.

Single Jelly fishes in alcohol from Zanzibar, etc.

Compound Jelly fishes. The Portuguese man-of-war (*Physalia*), consists of a cluster of small polyps, united together under a large bladder like float. *Velella* has the polyps arranged in an oval cluster, with a transparent crest above. *Porpita* consists of a round cluster resembling a simple Jelly fish.

BOOKS.—L. Agassiz, Contributions to the Nat. Hist. of the United States, Vols. 3 and 4. A. Agassiz, N. American Acelephs, Catalogue Museum Comparative Zoology.

Echinoderms. Cases 202, 203, 204.

CRINOIDS. *Comatula* from Zanzibar, attached by a stalk when young. See fossil crinoids in case 45.

OPHIURIDÆ. Long-armed star fishes. *Ophiura appressa*, West Indies; *Ophiarachna maculata*, New Zealand. *Astrophyton* has the long arms branched into fine tendril-like divisions. Specimens from Eastport, Me.

ASTERIDÆ. Star fishes, *Asterias polaris*, Labrador; *Pentacerus reticulatus*, Florida, with short arms; *Artocerus muricatus*, Zanzibar; *Linckia lævigata*, Zanzibar; *Solaster endeca* and *Crassaster popposus*, North American species with ten arms; *Heliaster helianthus*, Chili, with many arms.

ECHINI. *Echinus esculentus*, from Europe. *Diadema antillarum* from Florida has long, sharp spines. *Acrocladia* from Sandwich islands has few and stout spines. The white specimen with round knobs is the same species with spines removed. *Podophora* has short, flat spines,

which cover it like a pavement. Some of the flat species are unsymmetrical and have holes and notches through them, as *Lobophora* and *Rotula*.

Spatangus is unsymmetrical, and has the mouth near one side instead of in the centre.

HOLOTHURIDEA. *Pentacta* has a soft cucumber-shaped body with five lines of suckers like the *Echini*. Around the mouth is a circle of tentacles which are usually drawn in out of sight. *Synapta* has a long, worm-like body and lives buried in sand. *Lophothuria* has one side of the body covered with hard scales, and creeps on the other, which has three of the rows of suckers.

BOOKS.—A. Agassiz, North American Star-fishes, in *Memoirs Mus. Comp. Zool.*, Vol. 5, No. 1, 1877, on the development of star-fishes. Revision of the *Echini* in *Illustrated Catalogue Mus. Comp. Zool.*, No. 7. Verrill, *Radiates of New England*, in *Proc. Boston Soc. of Nat. Hist.* A. Agassiz, *Homologies of the Pedicellariæ*, in *Am. Nat.*, Vol. 7.

Worms. Case 205.

A collection of tubes and cases of worms. *Diopatra cuprea*, tubes made of broken shells. *Serpula*, hard, shelly tubes. *Spirorbis*, small spiral shells on sea-weed. *Cistenides gouldii*, conical case made of sand. Finer tubes of mud. *Filograna*, fine shelly tubes stuck together in a lump.

Polyzoa. Case 205.

Clusters of shells of *Eschara elegantulus* from Jeffrey's ledge, sixty miles from Salem. Bryozoa from California. See native species, case 195.

Brachiopoda. Case 205.

Lingula, *Discina* and *Terebratulina* in alcohol. See also fossil species in cases 43 to 55.

Mollusca.

CEPHALOPODS. Case 123. Dried squid, *Loligo*, see specimens in alcohol in case 205. Jaws of large squid, see Verrill's description. Shells of Argonanta. Whole animal in alcohol in case 205. Shells of *Nautilus pompilius*. *Spirula*, internal shell of a cephalopod. Other species in alcohol in case 205.

PTEROPODS. Case 123. *Hyalea*. See also specimens in alcohol in case 205, in gallery.

GASTEROPODS. The collection of shells of snails begins at case 123 and goes to the left around the room to case 111. See Essex County Coll., case 230.

LAMELLIBRANCAIATA. The bivalve shells are in the cases from 110 to 106. See Essex Co. Coll., case 230.

BOOKS.—Colossal Cephalopods of the North Atlantic, A. E. Verrill, Am. Nat., Vol. 9. The Devil Fish and its Relations, N. E. Damon, Pop. Sci. Monthly, Vol. 14. Discovery of an Octopus inhabiting the coast of New England, Am. Nat., Vol. 7. Embryology of Fossil Cephalopods, by A. Hyatt, Bulletin Mus. Comp. Zool., Vol. 3, No. 5. Woodward's Manual of the Mollusca. Binney's Gould's shells of Massachusetts. Terrestrial Air Breathing Mollusks of the United States and Adjacent Territories of N. America, by W. G. Binney, Bulletin Mus. Comp. Zoology, Vol. 4, 1878. Fresh water Mollusks, E. S. Morse, Pop. Sci. Monthly, Vol. 7, p. 563. Nat. Hist. of the Oyster, Rev. Samuel Lockwood, Pop. Sci. Monthly, Vol. 6. The Tereido and its Depredations, Pop. Sci. Monthly, Vol. 13.

Crustacea. Cases 206, 207, 208, beginning at the right.

DECAPODA. *Brachyura*, Crabs. The Fiddler crabs, *Gelasimus*, have in the males one of the front claws nearly as large as the rest of the body. The *Grapsidæ* are flat, bright-colored crabs. The Oyster crabs, *Pinnotheres*, live inside the shells of Oysters and are often cooked and eaten with them. The crab eaten commonly in New

York belongs to the genus *Callinectes*. *Cancer irroratus* is the common rock crab of this neighborhood.

Macroura. The Hermit crabs, *Paguridæ*, have soft abdomens and conceal them in snail shells which they carry about with them. The fresh water lobsters, *Astacidæ*, live in ponds and rivers and often burrow under the banks, throwing up mounds of earth around their holes. The common sea lobster, *Homarus*, belongs to the same family. Next to the lobsters are the shrimps, *Crangon*, *Pandalus*, etc.

SQUILLIDÆ. *Squilla* from southern coast of the United States.

ISOPODA. *Cymothoa* lives parasitic on fishes; one species in the mouth of the Menhaden. The sow bugs, *Porcellio*, live on land in damp places. *Idotea* in salt water. A species of *Asellus* is common in fresh water ponds and in aqueduct pipes.

AMPHIPODA. Sand fleas, etc. See native species in case 196.

PHYLLOPODA. *Branchiopoda*. The museum contains a large collection of this group, including types described by Packard, *Branchipus*. *Apus*. *Cladocera*, Water fleas, see microscopic specimens of *Daphnia*.

COPEPODA. Small Crustacea swarming in both salt and fresh water. The parasitic *Caligus* and *Lernaea* belong near them.

CIRRIPIEDIA, *Barnacles*. Free swimming, like copepoda when young. They afterward attach themselves by the *antennæ* and become permanently fixed, and in some species surrounded by a hard shell. *Balanus balanoides* is the common shore barnacle on stones and posts. *Coronella* live on the skin of whales. *Lepas anatifera*, a stalked species, is common on ships' bottoms.

BOOKS ON CRUSTACEA.—Crustacea of the U. S. Exploring Expedition, by J. D. Dana. Early Stages of the Lobster, by S. I. Smith, in Fish Commission Report, 1875 and Pop. Sci. Monthly, Vol. 3, 1872. North American Astacidæ (Fresh water lobsters), by H. A. Hagen, in Memoirs of Museum Comp. Zoology, Vol. 2, No. 3, 1871. Habits of certain Craw-fish, by C. C. Abbott, Am. Naturalist, Vol. 9, p. 80. Descriptions of North American Phyllopoda, by A. S. Packard, jr., Report of Hayden's Survey, 1873, p. 613. Report of Peabody Acad. Sci., 1873. Barnacles, by J. S. Kingsley, American Naturalist, Vol. 11, p. 102.

Arachnida, Spiders, etc. Cases 283 to 286.

ARTHROGASTRA. The Scorpions have large claws on the palpi and the last joints of the abdomen narrowed into a tail, on the end of which is a poisonous sting. Dried specimens, 283; see also in case 209, some in alcohol.

The *Pedipalpi* have the front pair of legs very long and slender. Dried specimens of *Phrynus* and *Telyphonus*. The latter has a long slender appendage behind the abdomen.

The *Chernetidæ*. The false scorpions have large claws on the palpi, like scorpions. They are all small and some parasitic on insects.

The Daddy long legs, *Phalangeæ*, have all the legs long and slender. Dried specimens and enlarged drawings.

ACARINA. The Mites. Small animals, most of them parasitic. Dried specimens of *Trombidium* and *Ixodes*. Drawings of mouth-parts of *Trombidium*, and development of *Hydrachna*, a fresh water mite. See microscopic specimens. *Pycnogonidæ*, marine animals resembling long-legged mites.

SPIDERS. The dried specimens, except of the *Mygalidæ*, are from the neighborhood of Salem. The rest of the collection in alcohol can be seen at the office. The specimens are arranged in the following order.

MYGALIDÆ. Large species of *Mygale* from South America, and Trap-door spider from Corsica.

DYSDERIDÆ. Six-eyed spiders. Specimens of *Pylarus bicolor* and tubes of silk inhabited by the same attached to stone.

DRASSIDÆ. Drawing of *Drassus* and specimens.

AGALENIDÆ. Drawing of spider and web, and specimens of *Agalena naevia* and *Tegenaria medicinalis*.

CINIFLONIDÆ. Drawing of spider spinning and of spinning apparatus. Specimens of *Amaurobius*.

LYCOSIDÆ. The running spiders. *Lycosa carolinensis* is the largest native spider. Drawing of female carrying cocoon of eggs.

THOMISIDÆ. Crab spiders with flat bodies and the front two pairs of legs longer than the others. They often walk sideways.

ATTIDÆ. Jumping spiders; picture of *Salticus scenicus*. Specimens of *Attus*.

THERIDIIDÆ. Web-spinning spiders. Drawings of webs of *Linyphia*. Specimens of *Theridion tepidariorum*, the commonest house spider and other species.

EPEIRIDÆ. The round web spiders. Drawing of web. Specimens of *Epeira vulgaris* and others.

Next the dried specimens are trap door nests of spiders, *Cteniza californica* from southern California. Drawings of trap door nests. Drawings of the anatomy of spiders.

BOOKS — Structure and Habits of Spiders, by J. H. Emerton. Harvesting ants and Trap door spiders, by J. T. Moggridge. The triangle spider, by B. G. Wilder, Pop. Science Monthly, 1875. Practical use of spider silk, B. G. Wilder, the Galaxy, July, 1869. Aptera of the South Kensington Museum, by Andrew Murray, describes all the mites. Pedipalpi of N. America, H. C. Wood, jr., Journal of Philadelphia Acad. Nat. Sci., Vol. 5. Mites, ticks and other acari, Pop. Sci. Monthly, Vol. 14. Ter-

mayers researches on spider's silk. Proc. Essex Institute, Vol. 5. Phalangeæ of the U. S., by H. C. Wood, jr., Proc. Essex Institute, Vol. 6.

Myriapoda, Centipedes, Cases 210 and 283.

Cermatia forceps, a long-legged centipede, occasionally found in this neighborhood, but native farther south. *Scolopendra*, large species common on ships from warm climates. Native species of *Lithobius*, *Geophilus*, and *Polydesmus*. *Iulus*, "wire worm," large species from Africa and small native species.

BOOKS.—Chilopoda of N. America, by H. C. Wood, jr., Journal of the Philadelphia Acad. of Nat. Sci., Vol. 5.

Insects. Beginning at case 239.

GENERAL WORKS ON INSECTS.—Packard's Guide to the Study of Insects, Packard's Half hours with Insects. Packard's Common Insects. Burmeister's Entomology; Figuiet's Insect World; Lubbock's Origin and Metamorphoses of Insects; Harris' Insects of Massachusetts Injurious to Vegetation; Wood's Strange Dwellings.

The collection of insects on exhibition consists chiefly of North American species. The rest of the collection is kept in closed boxes and can be seen by persons interested at the office down stairs.

HYMENOPTERA. Ants, bees, etc., beginning at case 239. The Hymenoptera usually hatch as helpless maggots and live in nests and on food prepared for them by their parents. After reaching their full size they pass through a pupa condition, without eating or motion, during which they develop into the adult state. Many species live in large colonies, consisting of several kinds of individuals, and build earthen, wax, and paper nests.

In case 239 is a drawing of humble bee enlarged, and

below, the head still more enlarged to show the arrangement of the mouth parts. At the left are drawings of young bees in four different stages. In the following cases are: the honey bees, the humble bees (*Bombus*), the wood-boring bees (*Xylocopa*), and the burrowing bees (*Andrena* and *Halictus*). Wax honey combs with regular cells. Round cells of humble bees (*Bombus*), made by eating out balls of pollen. Cells of *Xylocopa* in a tube gnawed in wood. Nests of *Osmia* in holes in wood. Cells of *Ceratina* in pith of small stems. Cells of *Megachile*, made of pieces of leaves rolled together. Nest of bee in knot hole in pear tree. Earthen cells made underground by burrowing bees (*Andrena* and *Halictus*).

Next in case 241 are the wasps and hornets. Paper nests of wasps. See larger specimens in case 210. Open paper nests of *Polistes*. Mud cells of *Odynerus* covered with a lump of dirt. Single cells of *Eumenes fraterna*. Mud nests of *Pelopaeus*, some filled with spiders for the young to eat. Case 244. The Ants and the Gall flies, *Cynipidæ*. Galls are swellings on plants caused by insects laying their eggs in them. Galls on oak trees. Galls on rose and blackberry bushes. Galls of *Trypeta solidaginis* on stems of Golden rod. Galls on leaves. Case 247 the parasitic flies (*Ichneumonidæ*), cocoons of *Ichneumonidæ* and the saw flies.

BOOKS.—Langstroth on the Honey Bee. Sting of the Honey Bee, Pop. Sci. Monthly, Vol. 14, p. 635, Habits of the Humble Bees and the Leaf-cutting Bee, by F. W. Putnam, Proc. Essex Inst., Vol. 4. Humble Bees of New England and their Parasites, by A. S. Packard, jr., Proc. Essex Inst., Vol. 4. Ants, by E. R. Leland, Pop. Sci. Monthly, Vol. 7, Lubbock's observations on the Habits of Ants, Bees and Wasps, in Journal of the Linnæan Society, Vols. 12 and 13. Also in Pop. Sci. Monthly, Vol. 11, p. 39. Agricultural Ants of Texas, H. C. Mc. Cook, Proc. Philadelphia Acad.

LEPIDOPTERA. The butterflies and moths. Beginning at case 248. The lepidoptera hatch as caterpillars and most of them live on vegetable substances. When full grown they spin a cocoon in which they moult and become pupæ, with the partly developed legs and wings stuck together. They remain in this condition without eating, often all winter, and when they again moult become adult butterflies.

In case 248 is a drawing of a moth, *Zerene catenaria*. 1. Upper side with wings spread. 2. Under side with wings removed. 3. A scale from the wings. 4. Head from above, to show the mouth parts. 5. Head from in front, with palpi and maxillæ in natural position. 6. Pupa showing the partly developed legs and wings stuck together. 7. Larva of same moth. 8. Head of larva. Specimens of this moth are in case 258. In cases 248 to 251 are the day butterflies (*Papilionidæ*) cases 252 to 253 the hawk moths (*Sphingidæ*), *Sphinx quinquemaculata* is the adult of the common potato worm. Stems bored by larvæ of *Egeria*. Cases 254 to 260 contain the moths, most of them night fliers. Among the *Bombycidæ* in case 255 are several large native species, whose cocoons have been used for silk, and the commercial silk worm. Cocoons of *Bombycidæ*, including those of the common silk worm and several native species that have been used for silk. The *Phalænidæ* include the canker worms, and all have larvæ with feet only on the ends of the body and a looping gait. The clothes moth belongs to the *Tineidæ*. Cases of Bag worms carried about by them until full grown. Cocoons of Lepidoptera, caterpillars' nests, leaves gnawed or mined by caterpillars.

BOOKS.—Revision of American butterflies with notes on those known to occur in Essex Co., by S. H. Scudder. List of Butterflies of North America, by S. H. Scudder, Bulletin Buffalo Acad.

of Nat. Sci., Vol. 8. North American Silk Worms, L. Trouvelot, American Naturalist, Vol. 1. Silk worms and sericulture, in Pop. Sci. Monthly, Vol. 3. Monograph of the Geometrid Moths of North America, by A. S. Packard, jr., Memoir of Hayden's Survey, Vol. 10. List of Noctuidæ of North America, by A. R. Grote, Bulletin Buffalo Acad. Nat. Sci., Vol. 2, 1874.

DIPTERA, the flies. Case 261. The flies hatch as grubs or maggots and live in water or soft substances till full grown, when they pass into a pupa condition, during which they grow to the adult state.

The drawing in case 261 shows: 1. A fly with wings spread. 2. Head more enlarged to show the mouth parts. 3. The mouth parts still larger. 4. Young fly. In cases 261 to 263 are the mosquitoes, gnats and crane flies. The horse flies (*Tabanidæ*), the *Syrphidæ*, resembling bees and hornets, and the house and meat flies (*Muscidæ*).

Case 263. Galls caused by flies. Clusters of willow flowers deformed into pine-cone-shaped galls, by flies laying eggs in the bud.

BOOKS.—Transformations of the common house fly, with notes on allied forms, by A. S. Packard, jr., Proc. Boston Soc. Nat. Hist., Vol. 15. Catalogue of described Diptera of N. A., by R. Osten Sacken, in Smithsonian Miscellaneous Collections, Vol. 3, No. 1, 1862.

COLEOPTERA, Beetles. Cases 264 to 271. The beetles hatch as grubs and live in this form till full grown, when they pass into a pupa condition, in which they develop into the adult beetle.

In case 264 is a drawing of the common June beetle. 1. Upper side with left wings spread. 2. Under side. 3. Head showing mouth parts. 4. Young beetle. 5. Head of young. In the next cases are the Tiger beetles (*Cicindelidæ*); the ground beetles (*Carabidæ*); the water beetles (*Dytiscidæ*); the *Staphylinidæ* with short front wings under which the hind wings are folded; the *Scarabeidæ*,

some of which roll up balls of dung in which to lay their eggs; the June bugs (*Melolonthidæ*); the *Cetoniadæ*, including the largest beetles; the *Buprestidæ*; the spring beetles, *Elatерidæ*, which, when laid on their back, spring up like a jumping jack. The fire flies (*Lampyridæ*), the *Curculionidæ*, with the front of the head narrowed into a beak; the long horned beetles (*Cerambycidæ*), most of which live in wood when young; the *Chrysomelidæ* and the lady bugs (*Coccinellidæ*). Puff ball eaten by beetles, wood and bark eaten by beetles. Pine bored by *Mono-hammus*. Seeds eaten by beetles.

- * BOOKS.—List of Coleoptera of N. America, J. L. Leconte, Smithsonian Mis. Coll., Vol. 6, No. 3. Larval habits of the Blister beetles and remarks on other species of the family Meloidæ, by C. V. Riley, Trans. St. Louis Acad., Vol. 3, No. 4. Colorado Potato Beetles, C. V. Riley, Pop. Sci. Monthly, Vol. 7.

HEMIPTERA. Cases 272 to 274. The hemiptera come from the egg much like the adult, but without wings. The mouth parts are long and narrow and form a sucking beak.

In case 272 is a drawing of the common squash bug. 1. Upper side, with left wings spread. 2. Under side. 3. Head and mouth parts more enlarged. 4. Young with undeveloped wings.

The plant-lice, *Aphidæ* and *Coccidæ* live on plants, causing galls and various other injuries. Near these belong the singing locusts (*Cicada*).

The water boatman, *Notonecta*, and *Belostoma* and *Ranatra* live in fresh water ponds in this neighborhood. In the following families are the squash bug (*Anasa tristis*), the bed bug and *Euchistus punctipes*, which causes the buggy taste on berries. The lice belong to this order. See microscopic specimens.

Injuries by plant lice, thrips, etc. Copal and lack, se-

cretions from trees caused by plant lice. Cochineal insects. Sticks in which 17 year locusts (*Cicada*) have laid eggs. Skins of young *Cicada*.

BOOKS.—History and Anatomy of *Belostoma*, J. Leidy, in *Journal Acad. Nat. Sci.*, Philadelphia, Vol. 1. The grape *Phylloxera*, C. V. Riley, *Pop. Sci. Monthly*, Vol. 5.

ORTHOPTERA. Grasshoppers, Crickets, etc. Cases 275 to 279. Most of the orthoptera live on plants. They hatch formed much like the adult, and the wings develop as the grasshoppers increase in size.

The drawing in case 273 shows the red legged grasshopper. 1. Upper side, with the left wings spread. 2. Grasshopper just hatched. 3. Half grown grasshopper with rudimentary wings. 4. Head of grasshopper.

In the next boxes are the crickets, *Gryllidæ*. *Oecanthus niveus* is the species which sings at night in the last of summer. The mole crickets, *Gryllotalpa*, burrow under ground and eat grass roots. Following are the green grasshoppers, *Locustariæ* and the common grasshoppers, *Acrydiæ*. In case 277, Mantis. Case 278, the walking sticks, *Phasmida*. See the "walking leaf," *Phyllium*, from Seychelles Islands. *Diapheromera femorata* is the native walking stick. Following these are the cockroaches, *Blattariæ*. *Ectobia*, is the common house cockroach, or "water bug." *Periplaneta amaricana*, the cockroach of ships and storehouses. In case 279 are eggs of crickets and cockroaches.

BOOKS.—North American Orthoptera and catalogue of New England species, by S. H. Scudder, in *Boston Journal of Nat. Hist.*, Vol. 7. Songs of the Grasshoppers, by S. H. Scudder, *Am. Naturalist*, Vol. 3, p. 113.

NEUROPTERA. Case 279 to 282. The Neuroptera are most of them aquatic when young. The eggs are laid in water and the young live there on water animals till full grown.

The drawing in case 279 shows: 1. A young dragon fly nearly full grown. 2. Head of same, showing mouth parts. 3. Head of adult dragon fly.

In case 279 are the white ants, *Termitidæ*; the wood lice, *Psocidæ*; the day flies, *Ephemeridæ*; and following these are the dragon flies, *Libellulidæ*. In case 281 are the *Sialidæ*, including several large species, the *Hemero-biidæ*, among which is *Chrysopa*, whose larvæ live on plant lice; the ant lions, *Myrmeleon*, who live when young in conical pits in sand and eat the insects which slip in; and the caddis flies, *Phryganeidæ*, which live, when young, in water and cover themselves with tubes made of sticks and stones. See tubes in next case.

Cases of caddis worms, aquatic larvæ of Neuroptera. Nests and borings of white ants, *Termes*.

BOOKS.—Synopsis of described Neuroptera of North America, by H. A. Hagen, Smithsonian Misc. Coll., Vol. 4, No. 1, 1862. Transformations and Anatomy of *Corydalus cornutus*, Haldeman and Leidy, Memoirs Am. Academy, Vol. 4. Immature state of the Odonata, L. Cabot, Catalogue of Museum of Comp. Zoology, No. 5, 1872. Caddis worms and their Metamorphoses, Pop. Sci. Review, July, 1868.

THYSANOURA. Case 209. The silver fishes (*Lepisma*), and spring tails (*Produridæ*), belong to this order. See microscopic specimens.

BOOKS.—See descriptions of American species by A. S. Packard, jr., in Reports of Peabody Acad. Sci.

Fishes. Cases 30 to 37.

Amphioxus lanceolatus, case 30.

LAMPREYS. Case 30. *Myxine*, *Bdellostoma*, and *Petromyzon*.

SHARKS and SKATES. Case 30. Skeleton of skate. Small species in alcohol. Tails of large skates. Small saw-fish with the upper jaws extending beyond the

mouth, with horizontal teeth at the edges. Below are jaws of larger saw-fish, some sawed in two to show the teeth. On the shelves below are small sharks in alcohol. Head of Hammer head shark; four cornered shells of shark and skate eggs. On the bottom of this case, and the next, cartilaginous skulls and jaws of sharks. The skull and backbone of a shark.

GANOIDS. Case 31. Sturgeons in alcohol. *Amia*, a fish which breathes air. Gar-pikes, *Lepidosteus*, from western rivers.

TELEOSTEI. Fishes with bony skeleton. The rest of the fishes in the collection belong to this group. In case 31 are the trunk fishes, *Ostracion*, with the whole skin covered with a hard case of bony scales.

Case 32. *Tetradon*, *Monocanthus*, and below the bladder-fishes, *Diodon*.

Case 33. Pipe fishes, *Syngnathus*, and sea-horses, *Hippocampus*. The eels, among them, No. 3873, an electric eel, *Gymnotus*, in alcohol. The *Clupeidæ*, to which belong the herring, sardine, menhaden, etc. The pickerels, *Esox*, and on the bottom the salmon and trout.

Case 34. *Hydrargyra* and *Fundulus*, the Tom Cods. Blind fishes, *Amblyopsis*, from the mammoth cave. Gold fishes, *Cyprinus auratus*. Suckers, *Catostomus*. Horned Pout, *Pimelodus*. *Aspredo*, with large flat scales and stout spines in front of each fin.

Case 35. Flounders in alcohol, and skeletons. Skeleton of cod and frost-fish. Dried gills of cod. Flying fishes, *Exocætus*; Bill fishes, *Belone*, *Scarus*, *Sphyraena*; Trumpet fish, *Fistularia*, dried.

Case 36. Lump fish, *Cyclopterus*. *Prionotus* and *Trigla* with very large front fins. *Chironectes*, with long-jointed front fins. Head of the monk-fish, *Lophius*. Toad fish, *Batrachus*. The sucking fish, *Echeneis*, with a sucker on

the top of the head by which it adheres to other fishes. Bottom of the case, mackerel, *Vomer*, *Acanthurus*. Eyes of sword-fish, see specimen on top of case in middle gallery.

Case 37. The *Etheostomata*, a family of very small fishes, and the Perch family. In the lower part of this case begin the Amphibia.

BOOKS.—Notes on *Bdellostoma*, by F. W. Putnam, Proc. Boston Soc. Nat. Hist., Vol. 15, on *Myxine*, Vol. 16. Skates' eggs and young, by F. W. Putnam, Am. Naturalist, Vol. 3, p. 617. Gar-pikes, old and young, by B. G. Wilder, Pop. Sci. Monthly, Vol. 2. Respiration of *Amia*, B. G. Wilder, Proceedings Am. Assoc. for Advancement of Science, 1877, also in Pop. Sci. Monthly. Blind fishes of the Mammoth cave, Am. Nat., Vol. 6. p. 6, and Report of Peabody Acad. Sci., 1871. List of fresh water fishes of North America, D. S. Jordon, Bulletin Buffalo Academy Nat. Sci., Vol. 3. Reports of U. S. Commissioner of Fisheries.

Amphibia. Case 37.

Third shelf at the left. *Coecilia* has a long worm-like body without limbs. *Proteus* has external gills and lives in water. *Amblystoma* has external gills when young, but loses them as it becomes adult and breathes air and lives on land. Below are the Toads and Frogs. See native species in case 201 up stairs.

BOOKS.—Holbrook's N. A. Herpetology. Check list of N. A. Reptiles and Batrachia, by E. D. Cope, Bulletin U. S. National Museum. Metamorphosis of *Siredon* into *Amblystoma*, O. C. Marsh, in American Journal of Science, Vol. 46, 1868.

Reptiles. Case 38.

Geckoes, climbing lizards, common in houses in warm countries. Chameleons. Horned lizards from southwestern United States. Skeleton of lizard. Large stuffed lizard from Australia. Flying lizard with a fold of skin.

extended on stiff rays between the legs each side of the body.

Cases 39 and 40. Snakes in alcohol; stuffed skins and skeleton of Boa from S. America. Skins of Rattlesnake, *Crotalus* in case 40.

Cases 41 and 42. Turtles. Beginning at the top, *Testudo indica*, land turtles from Galapagos island and Madagascar. *Testudo carolina*, Gopher, from the southern states. *Testudo radiata*, Madagascar. *Chelonoides tabulata*, land turtle from South America. *Cistudo clausa*, the common box turtle. *Kinixys*, a turtle with the upper shell hinged behind, from Cape Palmas, Africa. *Macrochelys lacertum*, mud turtle of the southern states. *Chelys fimbriata*, a rare turtle from S. America. *Trionyx*, with only the middle of the shell hard. *Chelonia midas*, green turtle, a sea species used for food. *Eretmochelys imbricata*, hawk bill turtle, a marine species with the scales lapped over one another. The shell is used for combs, etc.

Cases 124 to 127. Alligator, *Mississippiensis*, several stuffed skins. Skull of East India crocodile.

BOOKS.—Holbrook's N. A. Herpetology. Check list of North American Reptiles and Batrachia, by E. D. Cope, Bulletin of U. S. National Museum. Researches on the Venom of the Rattlesnake, by S. Weir Mitchell, in Smithsonian Contributions, Vol. 12. Serpents by Elias Lewis, in Pop. Sci. Monthly, Vol. 4.

Birds. Cases 67 to 77.

Cases 67, 68, 69, 70. The perching birds, *Passeres*. See native species in western gallery, cases 180 to 192.

Case 68. Birds of Paradise. Case 69. Hornbills, see head with surface of beak removed to show cellular structure inside. Case 70. Humming birds and Whippoorwills.

Case 70. Cuckoos and Toucans. Case 71. Woodpeckers and Parrots.

Case 72. Birds of Prey: Owls, Hawks, and Vulture.

Cases 73 and 74. The scratching birds; Guinea hen, Peacocks, male, with long tail, female, with short tail and dull feathers, old female, with part male plumage. Argus Pheasant, male, with long, spotted wing and tail feathers. Turkeys, Grouse, Partridges.

Case 73. Pigeons.

Cases 75 and 76. Wading birds: Plovers, Ibises, Spoonbills, Herons, Rails, Flamingoes. See Essex Co. collection in cases 184, 185, up stairs.

Cases 76 and 77. Swimming birds, Ducks and Geese, Pelicans, Gannets, Cormorants, Gulls, Terns, Albatross, Petrel, Loon, Grebe, Auk, Penguin.

Cases 124 to 127. Bird's nests and eggs.

BOOKS.—Coues' Key to N. American Birds. Pacific Railroad Survey and Report, Vol. 9. Audubon's Birds of America, large and small editions. A Feather, W. K. Brooks, Pop. Sci. Monthly, Vol. 4. Walking, Swimming and Flying, Pop. Sci. Monthly, Vol. 4. Birds of Paradise, Pop. Sci. Monthly, Vol. 5. The Humming Birds, Pop. Sci. Monthly, Vol. 5. American Owls, Pop. Sci. Monthly, Vol. 11. The Poultry Book, H. Weir. Darwin's Animals and Plants under domestication.

Mammalia. Beginning at case 78.

MONOTREMATA. Duck billed Ornithorhynchus and Echidna, from Australia.

MARSUPIALIA. Cases 78 and 79. All Australian except the American opossum in case 79. These animals all have a fold of skin under the abdomen, in which the young are carried for some time after birth.

EDENTATA. Case 80. *Myrmecophaga*, Great Ant Eater from S. America; *Manis*, Scaly Ant Eater. Armadillos with the skin covered with bony plates, under which the

head and feet can be drawn and the body rolled up into a round, hard ball as in some of the specimens. The sloths live on leaves of trees and hang under the branches by their claws.

PERISSODACTYLA. Case 80. S. American Tapir; horns and skin of Rhinoceros. See also horns on gallery railing. Skull of Ass. Skulls and foot of Horse. Cast of fossil skull and foot of Palæotherium.

CETACEA. Whales and Porpoises, case 81. Marine animals with only front limbs. Skeleton of Puffing Pig, *Phocæna*. Skeleton of Blackfish, *Globiocephalus* hangs over case 120. Under same case is one side of the lower jaw of a whale. In case 81 is the whalebone from one side of the mouth of a small whale. See picture of skeleton above. Young porpoises in alcohol.

ARTIODACTYLA. Cases 81, 82, 83, 84. In case 81, Goat, skulls of Goats and Sheep and Camel. Case 82. Oxen, Buffalo, Bison, below Antelopes. Upper shelf, Musk Deer and skeleton; head of Prong horn Antelope; head of Moose without horns; at the left, head of Caribou; long horned deer from India; stuffed skin of Red deer, *Cervus virginianus* and skull of same. Case 84. Hogs, South American Peccary; *Erinaceus* from Madagascar; skulls of Hogs; below, heads of Hippopotamus.

PROBOSCIDEA. Case 84. Skull and teeth of Elephant. See teeth of *Mastodons* in case 128.

RODENTIA. Case 85. Have two large front teeth in each jaw, for gnawing hard substances. See skulls and wood gnawed by beaver. Case 85. Beginning at upper shelf, Squirrels; *Spermophilus*; Prairie dog; Woodchuck; skull, feet, and tail of Beaver; Gopher; Rats and Mice; Flying Squirrel; Western Shrew; Hedgehog; Agouti and Guinea Pig. Skin and skeleton of Hare.

INSECTIVORA. Case 86. Moles, skins and skeleton.

PINNIPEDIA. Seals. Case 86. Skins of two seals and head of Walrus.

CARNIVORA. Cases 86 and 87. Skull and foot of Grizzly bear. Two skins of Coati from Central America; Civit cat, *Viverra*; Mongoose; Weasels; common Red Fox; wild dog of Australia. Case 89. Leopard. Skeleton of S. American Tiger.

CHERIOPTERA. Bats. Case 87. Skins and skeleton.

PROSIMIA. Lemurs. Case 88.

MONKEYS. Cases 89 and 28.

MEN. Case 28. Two skeletons of adults, skeleton of child, head of child with bone removed from upper jaw, showing second teeth; skulls of various races; casts of heads of Hottentot and flat-head Indian.

BOOKS.—Opossums and their young, Pop. Sci. Monthly, Vol. 8.

Nat. Hist. of the Kangaroo, Pop. Sci. Monthly, Vol. 8. Description of the whale that came ashore in Boston harbor, Nov. 25, 1871, by T. Dwight, jr., Proc. Boston Soc. Nat. Hist., Vol. 15. Antelopes and Deer of North America, by J. D. Caton. The American Antelope, J. D. Caton, Am. Naturalist, Vol. 10. The American Bison, living and extinct, J. A. Allen, Memoirs Mus. Comp. Zool., Vol. 4, No. 10. The Plant Eaters (Ruminants) of North America, Pop. Sci. Monthly, Vol. 10. The Hippopotamus and her young, by Frank Buckland, Pop. Sci. Monthly, Vol. 3. The wild Elephant, by J. Emerson Tennent. Range of the Mammoth, W. Boyd Dawkins, Pop. Sci. Review, July, 1868. Morgan's North American Beaver. Monographs of N. American Rodentia, Coues and Allen, Memoirs Hayden's Survey, Vol. 2, 1877. The Norwegian Lemming, Pop. Sci. Monthly, Vols. 4 and 11. Synopsis of the Muridæ of N. America, E. Coues, Proc. Philadelphia Acad. Nat. Sci., 1874. Fur Bearing Animals of N. America, E. Coues. Animals and Plants under domestication, Darwin. The Eared Seals, by J. A. Allen, with account of the northern fur seal. by C. Bryant, Bulletin Mus. Comp. Zool., Vol. 2, No. 1. Bears, Pop. Sci. Monthly, Vol. 6. The Coati mundi and its cousins, by Rev. S. Lockwood, Pop. Sci. Monthly, Vol. 2.

Bats and their young, B. G. Wilder, Pop. Sci. Monthly, Vol. 7. Monograph of Bats of N. America, by H. Allen, M. D., Smithsonian Miscellaneous Collections, Vol. 7. Anatomy and Habits of the Gorilla, Savage and Wyman in Boston Journal of Nat. Hist., Vols. 4 and 5.

FOSSILS.

[Cases 43 to 55.]

Remains of animals which have been buried in earth that has hardened into stone. This process takes place under water, and fossils are usually the remains of plants and animals which live in or near water. The most common are shells of mollusks, corals, bones of vertebrate animals and stems and leaves of swamp plants and sea weeds. Some fossils are simply buried without their chemical condition being changed. In others the original material has been gradually dissolved away and replaced by other substances without changing the shape of the objects. The collection is arranged according to the age of the rocks, beginning with the oldest at the right at case 55.

Palæozoic Age.

POTSDAM PERIOD.

POTSDAM EPOCH. Case 55. BRACHIOPODS. *Lingula prima*, the oldest species. WORMS. Tubes of *Scolithus linearis*. TRILOBITES, crustacea allied to the horse-shoe crab, *paradoxides harlani* from Braintree, Mass. and *Conoccephalus minutus*.

CALCIFEROUS EPOCH. ACALEPHS. *Tetradium fibratum* an Acaleph coral and Graptolites the flattened remains of compound hydroids. See recent hydroids in case 194. MOLLUSKS. *Orthoceras*, a straight nautilus and *Maclurea magna* a snail shell.

TRENTON PERIOD. Cases 33, 54, 55. PLANTS. On the bottom of case large sea weeds *Buthotrephis succulens*. CORALS. Third shelf. *Constellaria*, etc. TRILOBITES. Fourth shelf. *Isoteles gigas*, *Calymene senaria*. BRACHIOPODA. *Lingula quadrata*, *Orthis*, *Strophomena*. MOLLUSCA. Shells of snails. Fifth shelf. *Orthoceratites*, *Conularia* supposed shell of *Cephalopod*.

HUDSON PERIOD. Case 52. PLANTS. *Annularia brevifolia*. GRAPTOLITES. CORALS. *Favositella stellata*. MOLLUSKS. *Avicula demissa*. BRACHIOPODS. *Ambonychia radiata*.

NIAGARA PERIOD.

MEDINA EPOCH. Case 52. SEA WEEDS. *Arthropycus harlani* bottom of case 52.

CLINTON EPOCH. Case 52. BRACHIOPODS, second shelf. CORALS. *Favosites*, third shelf.

NIAGARA EPOCH. Case 52. CORALS. Fourth shelf. *Syringopora*, with the polyps wide apart. *Favosites niagarensis*. *Halysites* with rows of cells projecting above the stone. BRACHIOPODS. Fifth shelf. Sixth shelf, *Orthoceratites* and other *Cephalopod* shells.

LOWER HELDERBERG PERIOD. Case 51. WATER LIME GROUP. *Eusarcus scorpionis*, from Buffalo, N. Y. *Tentaculites*, supposed to be shells of Pteropod Mollusks. BRACHIOPODS. *Strophodonta raristriata*. LOWER PENTAMERUS GROUP. CORALS. Stems of *Crinoids*. BRACHIOPODS. *Pentamerus galeatus*, *Rhynchonella mutata*, *Delthyris*, *Strophomena rugosa*. UPPER PENTAMERUS. CRINOIDS. *Aspidocrinus scutelliformis*. CORALS, on upper shelf.

Devonian Age.

ORISKANY PERIOD. Case 50. BRACHIOPODS. *Spirifer*

arenosus, *Rensselaeria ovoides*. CRINOID stems. MOL-
LUSKS. *Avicula textilis*, *Platystoma ventricosa*.

CORNIFEROUS PERIOD. Case 49. PLANTS. *Fucoides*
cauda galli, shelf 4. BRACHIOPODS, shelf 5. ORTHO-
CERATITES, TRILOBITES. CORALS, shelves 3, 4, 5.

HAMILTON PERIOD. Cases 47 and 48. Case 45, 4th
shelf, Corals. Fifth shelf, Fucoids. Case 47, lower
shelf, *Spirifer* and other Brachopods. Fourth shelf,
shells of bivalve mollusks.

CHEMUNG PERIOD. Case 44. *Iingula* in black shale.
See cretaceous period for cast of head of Reptile in
this case. Pecten shells, Operculum of fish.

Carboniferous Age.

SUB-CARBONIFEROUS PERIOD. Cases 43, 44. FERNS.
CORALS, *Astræa rugosa*. BRACHIOPODS. CRINOIDS.
Platycrinus, *Pentremites*.

CARBONIFEROUS PERIOD. Cases 43, 44, 45. First
shelf, fossil plants in shale and coal. Second shelf,
stems of plants. At the left a fish on a flat stone.

Age of Reptiles.

TRIASSIC PERIOD. Cases 43, 44, 45. Fossil fishes,
shells of Ammonites and bivalve mollusks.

JURASSIC PERIOD. Cases 43, 44, 45. CRINOIDS. Large
specimens on flat stones, 5th shelf. AMMONITES, 6th
shelf, fossil FISHES. Cast of crustacean *Erion pro-*
pinquus. Reptile skeletons in opposite case. 128-131.

CRETACEOUS PERIOD. Cases 128-131. CORALS. OYS-
TERS and other shells. Teeth of SHARKS. Large
bones of REPTILES. Cast of skull of *Mososaurus*,
natural size, in case 44.

Mammalian Age.

TERTIARY PERIOD. Eocene shells from Alabama. Cases 128 to 131.

QUATERNARY PERIOD. Fossil wood. Cases 128-131.

Western side, upper part of same cases, bones and teeth of Mastodon. Cast of the Neanderthal human skull, *Castoroide ohioensis*. Cast of head of Dodo, *Didus ineptus*, from Mauritius. Post Pleiocene shells.

Books.—Hunt, Chemical and Geological Essays. Dana's Manual of Geology. Annual Deposit of the Missouri River during the Post Pleiocene, J. E. Todd, Proc. Am. Assoc. for the Advancement of Science, Vol. 26, 1877. Deposits of the Atlantic in deep water, and their relation to the White Chalk of the Cretaceous Period, Pop. Sci. Review, Jan., 1870. Footprints in the Rocks, Pop. Sci. Monthly, Vol. 3. Sandstone fossils of the Connecticut Valley, by James Deane, Journal of Philadelphia Acad. of Nat. Science, Vol. 4. Botany of a coal mine, Pop. Science Review. The Gigantic Moa Bird, Pop. Sci. Monthly, Vol. 12. Marsh, Succession of Vertebrate Life in America, Proceedings of Am. Assoc. for Adv. of Science, 1877.

ETHNOLOGICAL COLLECTION.

[*Eastern side.*]

Shell Mounds.

Along the sea-coast, wherever there is a supply of clams, are found piles of shells left by the ancient inhabitants and mixed with them are pieces of ashes and charcoal and the bones of animals that have been eaten, with occasionally stone tools, bones which have been artificially sharpened and pieces of pottery. In case 288, are bones from the shell deposits at Goose Island, Casco Bay, identified as far as possible by comparison with those of recent animals. Case 289. Worked bones from shell heaps at

Ipswich Neck. Case 292. Broken Pottery from shell heaps.

Books. An account of the Kjockkenmoeddings, or shell-heaps in Maine and Massachusetts, by Prof. J. Wyman, *Am. Naturalist*, Vol. 1, p. 561. Fresh water shell mounds of the St. John's river, Florida, by Prof. J. Wyman, *Am. Naturalist* Vol. 2, and *Memoirs Peab. Acad. Sci.*, No. 3, 1875.

Stone Tools.

These are found in graves of Indians or people of older races, and ploughed up in the neighborhood of their camps and burial grounds. Cases 293 and 294. Stone tools from the neighborhood of Salem. Cases 295 and 296. Stone arrow heads. Case 297. Stone, Bone and Reindeer horn tools from the lakes in Switzerland, where the ancient inhabitants lived on platforms over the water. Some of these specimens show how the stone tools were mounted in handles of reindeer horn. Case 298. Stone tools from Europe. Cases 299 to 308. American stone tools. See also stone tools in case 2 and stone mortars in case 21 lower floor. Case 309 contains modern stone tools from Pacific islands showing how they are fastened in handles.

Cloth and Shoes from Caves.

At the southern end of this gallery, Case 287 contains shoes and other objects from Salt Cave, Kentucky. See *American Naturalist*, vol. 9, page 410.

Beads and Money.

Case 289. Beads from ancient graves. Shell beads used for money, from graves and mounds.

On American Indians and prehistoric races see the following books. *Flint Chips*, a guide to prehistoric Archæology, by E. T. Stevens. *Art in the stone age*, *Pop. Sci. Monthly* Vol. 2, p.

343. Methods of making stone implements, by Paul Schumacher Bulletin Hayden's Survey Vol. 3, No. 3. Ancient Monuments of the Mississippi Valley, by Squier and Davis, Smithsonian Contributions to knowledge Vol. 1. Aboriginal monuments of the State of New York, by E. G. Squier, Smithsonian Contributions Vol. 2. Ancient Earthworks in Ohio, C. Whittlesey, Smithsonian Contributions. Vol. 3. Ancient fortifications on the Wabash river, by F. W. Putnam, Proc. Boston Soc. Nat. Hist. Vol. 15, p. 28. Shell money by R. E. C. Stearns, Am. Nat. Vol. 3. Nicaragua, People, Scenery and Monuments, by E. G. Squier, Reports Peabody Mus. of Archæology and Ethnology, Cambridge. Pottery of the mound builders, by F. W. Putnam, Am. Naturalist Vol. 9. Archæological Explorations (in caves) in Indiana and Kentucky, by F. W. Putnam, Am. Naturalist, Vol. 9 and Proc. Boston Soc. Nat. Hist., Vol. 17. Rude stone monuments, Ferguson. Cave dwellers of France, by Paul Broca, Pop. Sci. Monthly, Vol. 2. Lyell's Antiquity of Man.

Weapons.

Cases 136 to 142, Weapons from the Pacific islands. See also the spears on the gallery railing. Case 143, Swords, spears and knives. Cases 144 to 147, bows and arrows. Case 148, Shields. Case 149, Guns, powder bottles, etc. Over this case Chinese cannon R and S.

Boats.

Cases 150 to 159. Boats and paddles. Over case 156 is an Esquimaux canoe, and over case 140 an Indian birch canoe. Over case 160. Model of boat of east coast of Africa. Over case 153. Malay war vessel.

Temples and Graves.

Cases 1 and 2. Models of Feejee temples and Chinese pagodas, Hindoo burial monument, bronze images from a sunken temple in Java. On upper shelves, No. 2002, Chinese tapers to burn at religious services, pottery from

graves, heads carved in green stone from New Zealand. Masks and cloth from mummies. No. 4666, dried head from Solomon Islands, parts of Egyptian mummies, small images from Egyptian graves. In the lower part of case 2 is an Indian skeleton from Marblehead, dug up without disturbing the arrangement of the bones, photograph of the same skeleton as it lay with three others. Shells, copper tubes, etc., from the same graves. On the shelf above are part of a soapstone pot, bones, stone tools, etc., from a grave on Winter Island, Salem.

See account of these Marblehead graves in *Bulletin Essex Inst.*, 1874.

Clothing and Ornaments.

Case 3. Feather head dresses and ornaments of South American Indians, bead work of North American Indians, mask worn by Pacific Islanders.

Case 4. Waterproof garments made of seal intestines, seal skin leggins and boots, hat, No. 4385, from Nootka Sound, northwest coast of America. Wooden hat trimmed with bone and bristles of seal, N. W. Coast.

Case 5, upper shelf, wigs from Feejee Islands and straw hats from Australia. Second shelf, fans and fly brushes. Third shelf, beads and necklaces. Mask, No. 3807, from Nootka sound, N. W. coast of America. Shell mask from Otaheite. Fourth shelf, bracelets, collar, made of feathers and shark's teeth from Feejee Islands. Fifth shelf and below. Bracelets, belts, braided cord from Pacific islands. No. 4550, braided ball from New Zealand.

Case 6, upper shelves. Women's skirts, Feejee Islands. Behind, seal skin coat and clothing from Pelew Islands. Below, blanket from N. W. coast of America.

Case 7. Hanging from top of case, scarf worn over the shoulders by women, Loando, Africa. Upper shelf. Skirts

of women of Bijonga Islands, west coast of Africa. Second shelf, leather apron, east coast of Africa, calico from Japan, silk scarf, China. Lower shelves, grass cloth from Madagascar, New Guinea, etc. See labels. Under middle shelf, skin saddle, worn by women to carry children on. W. coast of Africa.

Case 8. Behind the shelves, blanket and cloak covered with long fibres, like a thatched roof, from New Zealand. Below these, Australian cloak of flat leaves and American snow-shoes. At the top of the case, a saddle. Upper shelf Japanese waterproof clothing made of varnished paper. Second shelf, white jacket and embroidered mask worn by women, Muscat. Fringed towel from Burmah. Lower shelves, shoes. On the bottom of the case folded up, a coat made of leaves from India.

Case 9. Top, Chinese hat, caps from India. Second shelf, Turbans of Banyans, Zanzibar. Third shelf, caps from west coast of Africa, conical cap made of bark of palm bud from Central America. Lower shelves, shoes, hats behind the shelves.

Chinese and Indian Figures and Costumes.

Case 10. Chinese images, most of them from the collection sent to the Philadelphia exhibition, to show Chinese habits and costumes. Below are Chinese carvings, models of Chinese woman's feet and shoes, Japanese straw toys and toy birds made of charcoal.

BOOKS.—Costumes and Arts of China, Bertin, Chinese Empire, Winterbotham. History of China, Davis. Barrows' travels in China. Travels in China, Huc. Social life of the Chinese, Doolittle. The Middle Kingdom, Williams. Oriental Religions, S. Johnson. Foreigner in Far Cathay, Medhurst.

Cases 11 and 12. Chinese, Japanese and Indian cloth-

ing. Figures of Chinese merchants and Mandarin and Bombay merchant.

Case 13. Life size figures of natives of India. At the left, two beggars. In the rear, three merchants seated in chairs and two clerks standing behind them; another clerk sits on the floor in front and near him stands an umbrella carrier. In front, at the right, are Hindoo beggars, a Buddhist priest, a snake charmer and a tailor. The painting is of the Imaum of Muscat. The small figures represent, at the left, on upper shelf, dancers. Second shelf, merchant seated in a chair, clerk, writing, seated on the floor and pipe-bearer. Below, is the royal family of Persia, riding on an elephant. Over the stairway are figures from Calcutta, among them a group carrying a palanquin, an ox-team and water carriers. See labels. On the shelves, at the right, are men with their arms stiffened by holding them long in one position, as a religious service. Below, are two priests, smoking.

Paper, Straw and Bark.

Case 14. Chinese kites, bark cloth from South Sea Islands. Broom of Cocoa nut fibre. Case 15, straw mats from Zanzibar, Chinese paper, East India writing on palm leaf, spinning wheel from Java. Models of houses in Manila, Chinese flag, Chinese paintings on silk, illustrating a fairy story.

Writing Materials.

Case 15. Inkstands, pens, and brushes.

Harnesses.

Case 16. Bridles, spurs, whips, and bits, saddles, stirrups. Stone balls attached to leather cords, used for catching cattle in South America.

Measures.

Case 17. Chinese compasses, Chinese balances.

Fish Hooks and Lines. Case 17, upper shelf.

Tools. Case 17.

Chinese and other carpenter tools. Below, spades and other farming tools.

Beds. Case 18.

Upper shelves, hammocks. Middle shelf, bed mats, head rests. Below, wooden stools.

Baskets. Case 19.

Upper shelves, Hindoo and North American baskets. Lower shelves, box, made of gourd shells, basket from Lombok Islands.

Hair-Dressing Instruments.

Middle of case 19. Combs, hair-pins, Mirrors, Razors.

Cooking Utensils. Case 20.

Straw dish covers hanging from top of case, from west coast of Africa. Wooden dishes, cups and boxes, spoons, chop sticks. Below, wooden bowls for fermenting beer, stone mortars for pounding grain.

Pottery. Cases 21 and 22.

Case 22. Ancient pottery from mounds in Peru. American pottery, 290, 291.

Musical Instruments. Cases 23 and 24.**Pipes and Tobacco.** Case 25.

Images and Idols.

Case 26, upper shelves, hindoo images. Third shelf, at the right. Hindoo images, hooks on which Hindoos hung themselves as a religious service. Left side of same shelf, images from Siam. Bottom of case, stone images, No. 2748, from Java. Part of images from Elephanta caves.

Case 27. Large wooden image from Hawaii. It was carved on the top of a high tree trunk, and was sawed off by missionaries. Small images from same island, Chinese gilded image, small Chinese figure, carved in reddish stone.

LARGE SPECIMENS, PICTURES, ETC., OUTSIDE THE CASES.

Eastern Side.

Over stairway, model of ship, "Friendship," built in Beverly, 1786, and owned by Pierce and Wait, Salem. The model is said to have been built on board the ship at sea. At the right is a model of the Frigate Constitution; at the left the Ohio. At the sides of the stairs are two Chinese earthen tubs. Opposite the stairs, below the two large cases, are two lower jaws of sperm whale.

Over the gallery cases on the eastern side are *V*, North American Indian birch canoe. *U*, Hindoo fans, portrait of Chinese merchant. *T*, umbrella from Calcutta, portraits of Hindoos. *R*, portrait of Elias Haskett Derby. *L*, Joseph Peabody. *M*, William Gray. (See Historical Coll. Essex Inst., Vol. 15, pp. 306, 307.) *S*, Chinese Gun. *R*, Chinese Gun, Chinese cane chair. *Q*, model of Malay war vessel. *P*, Esquimaux skin canoe.

Southern End.

Over gallery cases, *O*, models of Arabian Dow. *N*, Palanquin from Calcutta, see small model carried by men, in case 13, over stairway. Plants, all labelled. On lower floor, bones of whale, lower jaw and leg bone of elephant.

Western Side.

Over gallery cases, sections of wood. *D*, stuffed skin of Monk fish, *Lophius*. *A*, Mackerel Shark. *A*, portraits of Stephen C. Phillips; *B*, Nathaniel Bowditch, and *C*, Pickering Dodge. (See Historical Coll. Essex Inst., Vol. 15, pp. 288, 301.) *E*, Tautog. *F*, Haddock. *G*, Hake. *H*, Pollock. *I*, Cod. *J* and *K*, Horse Mackerel. *B* and *C*, Sturgeon. *L*, *Mola rotunda*, Sun fish.

Hanging from ceiling, opposite the plants, skeleton of whale, *Globiocephalus*. Under it, on the floor, one side of jaw of right whale. On lower floor between gallery stairs, plaster casts of fossil reptiles, blocks of Basalt, from the Giant's Causeway, large clay concretion, shells of *Tridacna*, Indian Ocean.

Northern End.

Portraits of D. William Orne. (See Essex Inst. Bulletin, Vol. 2, p. 43.) *N*, Samuel Tucker. *E*, Nathan Neal. (See Genealogy of Neal Family in library of Essex Inst.) *F*, Dudley L. Pickman. (See Hist. Coll. Essex Inst., Vol. 15, p. 308.) *G*, Benjamin Carpenter, first President

Salem Marine Society. Carpenter street, Salem, named for him. *H*, Nathaniel Silsbee. (See Hist. Coll. Essex Inst., Vol. 15, p. 285.) *I*, Allen Putnam. (See Centenary of the North Church, p. 215. *O*, Henry Elkins. *J*, Thomas Saul, Secretary of East India Marine Soc., and Janitor of Museum from 1840 to 1876.

On lower floor in the centre, large jaw of Sperm whale. At end of case 106, wood carving of Heaven and Hell.

Middle Gallery.

Western end, root of Banyan tree. Over cases, *W*, cup-shaped sponges, six specimens. *V*, Alligator. *Z*, Mackerel Sharks. *M*, Sword fish. *X*, Seal.

Heads and Horns.

Northern end, horns of American elk.

In the middle, over gallery stairs, horns of Moose. On the left, horns of Red deer, *Cervus virginianus*. At the right, foreign deer. Southern gallery, corner at the right, horns of Caribou.

Over bird case, Antelope horns.

220, Buffalo. 219, Ox from Sicily. Ox horns. 438, Domestic ox from Cape of Good Hope.

218 and next, African Musk ox.

184 and next, horns of sheep.

Five horns of rhinoceros to 448.

Corner over sponges, Rocky mountain sheep.

Railing of Eastern gallery and opposite, spears from Pacific Islands.

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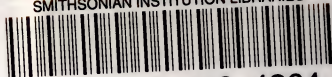
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